

THE TRUSTED SOURCE FOR DEFENCE TECHNOLOGY ANALYSIS

ARMADA

INTERNATIONAL



OCTOBER-NOVEMBER 2020. Issue 05.

VISIT...

LANZAROTE
Caliente.COM

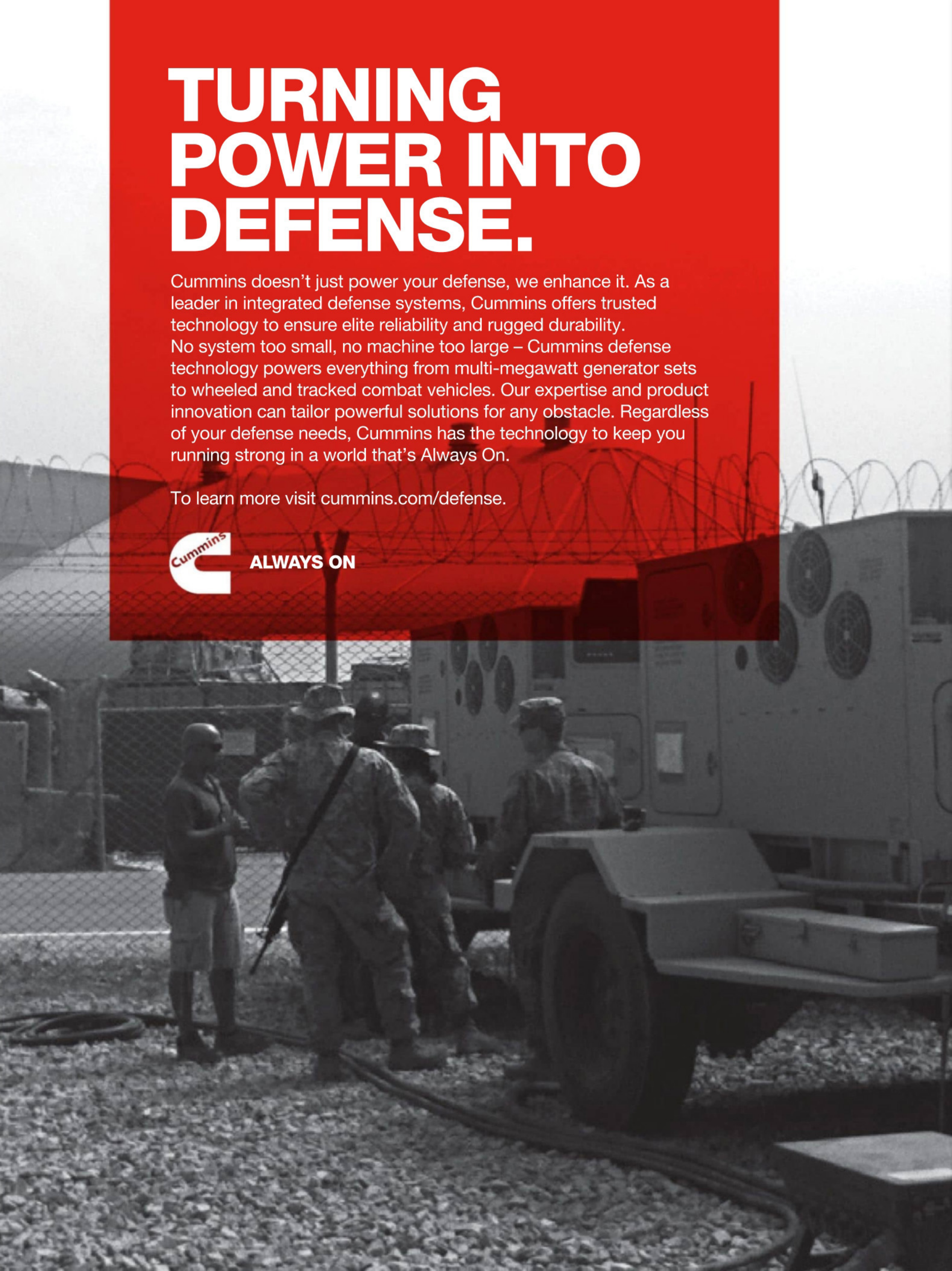
TURNING POWER INTO DEFENSE.

Cummins doesn't just power your defense, we enhance it. As a leader in integrated defense systems, Cummins offers trusted technology to ensure elite reliability and rugged durability. No system too small, no machine too large – Cummins defense technology powers everything from multi-megawatt generator sets to wheeled and tracked combat vehicles. Our expertise and product innovation can tailor powerful solutions for any obstacle. Regardless of your defense needs, Cummins has the technology to keep you running strong in a world that's Always On.

To learn more visit cummins.com/defense.



ALWAYS ON



CONTENTS



06

COMMANDER'S INTENT

ESG AMPHIBIOUS CAPABILITY BOOSTS US/ALLIED EURO-ATLANTIC PRESENCE

Rear Admiral Robert Katz, Commander explains to Dr Lee Willett how expeditionary strike groups are central to the amphibious capability of the United States and its allies.



9

AIR POWER

UAVS EVOLVE TO MEET THE CHANGING MISSION

Stephen W Miller reviews how UAVs are being used in the battlefield, from squad level to the brigade and beyond.



46

LAND WARFARE

RETHINKING RESUPPLY TO THE FORWARD LINE

Stephen W Miller examines how logistics delivery is transforming to keep the forward elements resupplied.



50

TECHNOLOGY FOCUS

HIGH FREQUENCY FOR SOF

Andrew White reports on why special forces are turning to High Frequency software defined radios, breaking their reliance on satellite communications.



55

ARMADA COMMENTARY

IS THIS TIME DIFFERENT?

Andrew Hunter asks if digital design will really deliver improve new aircraft delivery and sustainment.



14

TACTICAL RADIO SUPPLEMENT

Armada's annual examination of tactical military radios for the modern soldier. By Dr Thomas Withington



ON THE COVER:
Soldiers assigned to the 101st Airborne Division launched the first flight of the Martin UAV V-BAT on 2 June during the Future Vertical Lift (FVL) Future Tactical Unmanned Aerial System (FTUAS) capability assessment held at Fort Campbell, Kentucky. This is part of an assessment of capabilities for future UAS platforms in the US Army. (Martin UAS)

ARMADA INTERNATIONAL

Volume 44, Issue No.5, OCTOBER-NOVEMBER 2020

Published bi-monthly by Media Transasia Ltd.

Copyright 2012 by Media Transasia Ltd.

Publishing Office: Media Transasia Ltd.,
1603, 16/F, Island PL Tower, 510 Kings Road, Hong Kong

Editor-in-Chief: Andrew Drwiega

General Manager: Jakhongir Djalmatov

International Marketing Manager: Roman Durksen

Digital Manager: David Siriphonphutakun

Sales & Marketing Coordinator: Wajirapran Punyajai

Art Director: Hatsada Tirawutsakul

Production Executive: Wanlaya Thiangrungreung

Circulation Officer: Yupadee Seabea

Chairman: J.S. Uberoi

President: Egasith Chotpakditrakul

Chief Financial Officer: Gaurav Kumar

Advertising Sales Offices

FRANCE/SPAIN

Stephane de Remusat, REM International
Tel: (33) 5 3427 0130
E-Mail: sremusat@rem-intl.com

GERMANY

Sam Baird, Whitehill Media
Tel: (44-1883) 715 697 Mobile: (44-7770) 237 646
E-Mail: sam@whitehillmedia.com

UK

Zena Coupé
Tel: +44 1923 852537, zena@expomedia.biz

NORDIC COUNTRIES/ITALY/SWITZERLAND

Emanuela Castagnetti-Gillberg
Tel: (46) 31 799 9028
E-Mail: emanuela.armada@gmail.com

RUSSIA

Alla Butova, NOVO-Media Ltd,
Tel/Fax: (7 3832) 180 885 Mobile: (7 960) 783 6653
Email: alla@mediatransasia.com

USA (EAST/SOUTH EAST)/CANADA (EAST)

Margie Brown, Blessall Media, LLC.
Tel: (+1 540) 341 7581
Email: margiespub@rcn.com

USA (WEST/SOUTH WEST)/BRAZIL/CANADA (WEST)

Diane Obright, Blackrock Media Inc
Tel: (+1 858) 759 3557
Email: blackrockmediainc@icloud.com

INDIA

Sanjay Seth
Global Exposures
Tel: +91 11 466 96566 Mob: +91 9818 697279
Email: sseth.globex@gmail.com

TURKEY

Zeynep Özlem Baş
Mob: +90 532 375 0046
Email: media@oz-ist.com

ALL OTHER COUNTRIES

Jakhongir Djalmatov
Media Transasia Limited
Tel: +66 2204 2370, Mobile: +66 81 6455654
Email: joha@mediatransasia.com

Roman Durksen
Media Transasia Limited
Tel: +66 2204 2370, Mobile: +66 83 6037989
E-Mail: roman@mediatransasia.com



Controlled circulation: 26,050 (average per issue) certified by ABC Hong Kong, for the period 1st January 2018 to 31st December 2018.

Printed by Media Transasia Ltd., 75/8, 14th Floor, Ocean Tower II, Soi Sukhumvit 19, Sukhumvit Road, Bangkok 10110, Thailand.
Tel: 66 (0)-2204 2370, Fax: 66 (0)-2204 2390 -1

Annual subscription rates:

Europe: CHF 222 (including postage)

Rest of the World: USD 222 (including postage)

Subscription Information: Readers should contact the following address:
Subscription Department, Media Transasia Ltd., 75/8, 14th Floor, Ocean Tower II, Soi Sukhumvit 19, Sukhumvit Road, Bangkok 10110, Thailand.

Tel: +66 2204 2370 Fax: +66 2204 2387
Email: accounts@mediatransasia.com

INDEX TO ADVERTISERS

AR MODULAR	15	IDEF	53
ASTRONICS	35	IDEX	43
BERNIER	25	INVISIO	17
BERTIN TECHNOLOGIES	49	LEONARDO	COVER 4
BITTIUM	31	OTTO ENGINEERING	29
CODAN	45	ROHDE & SCHWARZ	23
CUMMINS	COVER 2	SAT-COM	21
D&S THAILAND	51	SCHIEBEL	11
DOMO TACTICAL		VIASAT	19
COMMUNICATIONS	33		

THIS MONTH ON ARMADAINTERNATIONAL.COM



■ BUSHMASTER ELECTRONIC WARFARE VEHICLES FOR DUTCH ARMY

In early July, the Dutch Army took delivery of its first new Bushmaster electronic warfare vehicle, paving the way for the possible retirement of existing EW platforms.



■ LORAN RUNS AGAIN

The LORAN (Long Range Navigation) radio navigation system is enjoying a new lease of life with E-LORAN promising improvements in accuracy and resistance to electronic attack.



■ GORSHKOV ELECTRONIC WARFARE UPGRADE PUZZLE

Why is the Russian Navy planning an upgrade of the electronic warfare systems adorning the 'Admiral Gorshkov' class frigates?

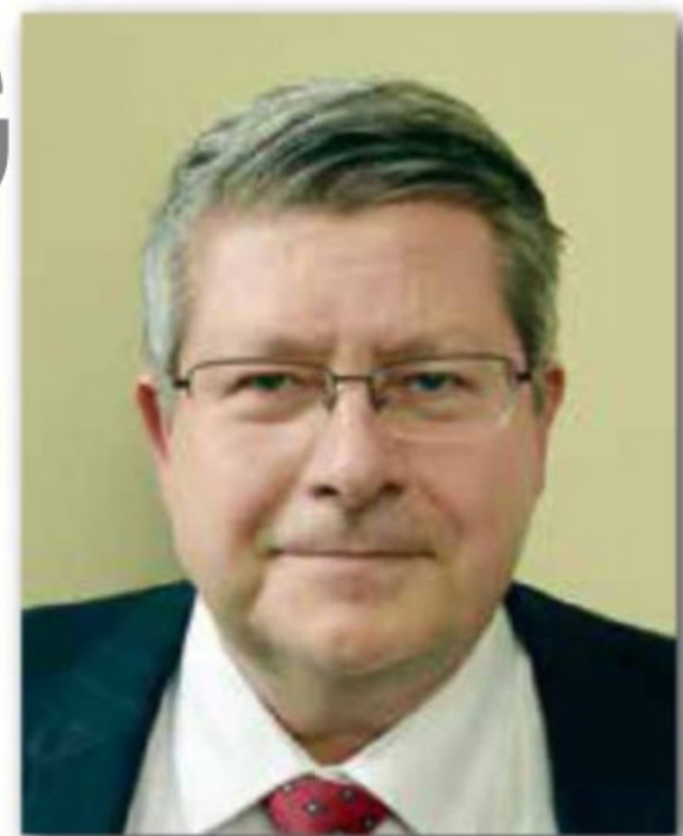


■ US ARMY BEEFS UP ELECTRONIC WARFARE POSTURE IN THE PACIFIC

Plans are afoot to strengthen the US Army's electronic warfare posture in the Pacific to disrupt People's Liberation Army communications during any future conflict.

Editorial

US MARINES TRANSFORMING TO FACE NEW PEER ADVERSARY



“**T**he United States Marine Corps generates 2.3 exabytes of data every day,” revealed Jennifer Edin, Assistant Deputy Commander for Information at Marine Headquarters. I had to look that up I must admit, and found that - to quote wikipedia - “one exabyte is one quintillion bytes (short scale)”, or to put it another way, it is more than a petabyte but less than a zettabyte. So that clears that up, right?

Edin then asked, “how do we make sense of that?” The challenge being faced by most developed military forces today including the Marines, is that the requirement is for each force, its joint partners within the national force, and international allies where required, to be seamlessly integrated so that essential information can be shared and exploited. At the same time, of course, these other entities are also generating their own volumes of data.

The development of artificial Intelligence and the adoption and spread of 5G networks - which will deliver greater bandwidth, giving higher download speeds, eventually up to 10 gigabits per second (Gbit/s) - will help to address this mountainous challenge, she explained.

“We need to be able to adapt quickly and then operate effectively in the information environment,” she said adding that

“information does not have a geographical boundary” meaning that it needs to be accessible wherever the Marines are operating.

Lieutenant General Eric M. Smith, deputy commandant, Combat Development & Integration, summarised what the USMC would need by 2030 to face a peer competitor “for the first time really since World War Two.” Requirements have been formed and are being enacted through the National Defence Strategy.

“We are most interested in a combination of command and control, C5ISR&T [command, control, communications, computers, cyber, intelligence, surveillance and reconnaissance, and targeting], any sensor - any shooter, we want the resilient architecture to allow us to stay forward in contact and still pass data to the joint force and to ourselves,” said Gen. Smith.

“We need long range lethal fires that are light enough but have the range to reach out, yet have the lightweight mobility so that we do not overly burden the naval logistics enterprise,” he continued. “We need to reach out hundreds of miles with all our effects, while staying mobile.”

Logistical resupply will be more difficult due to anti-access area denial (A2AD). Lieutenant General Charles G. Chiarotti, deputy commandant, Installations and Logistics, warned that “the USMC was not postured to sustain the force in the future

and that we do not have the right capabilities to address this peer adversary in a fully contested environment.”

Gen. Chiarotti said that in the past the Marine’s installations - there are 29 across the US and the globe - acted more like home bases. “Our installations are now war fighting platforms from which we will deploy and manoeuvre from. Holistically, logistic sustainment needs a new concept into a task organised force,” he stated. “We need to lighten the load; we need to reduce the requirement. We will no longer have the luxury of building up vast amounts of ‘iron mountains’ with days and days of supplies. Nor will we have that luxury to manoeuvre that across the battlefield. We also have to reduce the signature that logistics brings to the battlefield. A lot of challenges are still in front of us, he concluded.

The speakers were all taking part in the Report to Industry Panel staged on the first day of this year’s Modern Day Marine Expo which, like so many others, was held virtually over three days from Tuesday 22 to Thursday 24 September.

ANDREW DRWIEGA,
Editor-in-Chief

The US Navy Wasp-class amphibious assault ship USS *Bataan* (foreground) works with French and Italian ships during an exercise in the Mediterranean Sea in June 2020. The United States and European NATO member states are looking to increase integration levels in amphibious training and operational capability.

US Navy

ESG AMPHIBIOUS CAPABILITY BOOSTS EURO-ATLANTIC PRESENCE

Rear Admiral Robert Katz explains how expeditionary strike groups are central to building amphibious capability.

By Dr Lee Willett

Expeditionary Strike Group 2 “dynamically or deliberately employs combat-ready amphibious forces able to fight and win across the spectrum of conflict and competition, in support of national, theatre, joint, and maritime commander requirements,” stated Rear Admiral Robert Katz, Commander ESG 2, in a discussion with *Armada International*.

A primary role for COM ESG 2 and its staff, Rear Adm Katz explained, “is to provide enduring amphibious warfare expertise and advocacy” across the operational spectrum from high-end tasks down to supporting humanitarian assistance and disaster relief (HADR) operations. “This is a shift from the past as, traditionally, ESG 2 has focused on the force generation aspect of the commands within our ‘claimancy,’” the Admiral continued.

The maritime dimension of the returning great power competition in the Euro-

Atlantic theatre has seen NATO collectively and alliance member states individually respond by developing a range of different capabilities across platforms, sensors, and weapons.

What NATO has done, though, is generally bring these various capabilities together into task groups. Perhaps one defining feature of NATO’s at-sea response to increasing Russian maritime activity across the theatre is the increasing presence of such task groups.

A dominant risk for NATO is Russia’s apparent development of a strategy and incumbent capabilities to establish anti-access/area denial (A2/AD) ‘bubbles’ across the Euro-Atlantic theatre. Such ‘bubbles’ appear designed to deny NATO, and especially US forces, access to certain waters and regions.

One key response capability NATO possesses in large scale and at the high end of the operational spectrum is the concept

of ‘amphibiosity’. Amphibious warfare capabilities provide capacity to project deterrence, wider influence, and kinetic effect across the seam between the maritime and land domains. Several NATO member states – the United States, the United Kingdom, France, the Netherlands, and Spain – provide the core of the alliance’s amphibious capability. Several others including Germany, Greece, Italy, Norway, Poland, Portugal, Romania, and Turkey contribute regularly and significantly.

Many of these countries combine their amphibious capabilities for exercises and operations, and largely in task groups. In such NATO amphibious task groups (ATGs) operating in the Euro-Atlantic theatre, US forces often provide the ‘framework’ within which to combine such capabilities. The US contribution would be two-fold: the US Navy (USN) could provide the power projection platforms in the form of amphibious shipping; while the US Marine



Rear Admiral Robert Katz (Commander Expeditionary Strike Group 2 [COM ESG 2]) opens an Amphibious Ready Group and Marine Expeditionary Unit Staff Planning Course (AMSPC) hosted by Expeditionary Warfare Training Group Atlantic.

Corps (USMC) could provide the power projection and combat capability in the form of marine expeditionary ground forces.

The primary US operational constructs that integrate such amphibious platforms and ground forces are its Expeditionary Strike Groups (ESGs). The US currently operates three numbered ESGs – 2, 3, and 7 – based at: Virginia Beach, Va (ESG 2); San Diego, Ca (ESG 3); and White Beach, Okinawa and Sasebo, Japan (ESG 7).

The East coast-based ESG 2 located at Joint Expeditionary Base Little Creek, Virginia Beach, makes a significant contribution to US Euro-Atlantic theatre presence. This presence is further reinforced by the recent co-location of several other US and NATO commands in Norfolk, including US Second Fleet and NATO's Joint Forces Command Norfolk (JFC Norfolk). The processes of operationalising and integrating such commands are essential to generating increased effect in theatre.

ESG 2's 28 subordinate commands within this 'claimancy' encompass: the East Coast-based amphibious shipping (including four dock landing helicopter [LHD] amphibious assault ships, four amphibious transport dock ships [LPDs], and six dock landing ships [LSDs]); the three O-6-level staff squadron commands these forces report to; tactical air and assault craft units; and broad mix of supporting assets. One of the most notable recent additions to ESG 2's inventory has been two expeditionary sea base (ESB) ships, ESB 3 and ESB 4.

One of the latter, USS *Hershel Williams*, sailed in July 2020 for its inaugural deployment. Highlighting a growing trend within the USN for forward deploying assets to reduce transit time, the ship is intended to provide long-term presence at sea for US Africa Command (AFRICOM).

Rear Adm Katz noted that the hybrid (civil-military) crewed ESB platforms will spend significant time forward deployed, for example to the US Fifth and Sixth Fleet areas of responsibility (AORs) in the Gulf and Mediterranean regions, respectively. Their forward deployment will be supported by a dual-crewing model for their military component, with the two military crews rotating in theatre.

Such forward-deployment constructs reflect the USN's wider focus on more effective force employment. "We have recently begun the task of operationalising our staff to shift away from force generation and instead focus on force employment," Rear Adm Katz explained. Building on this shift, which has been taking place over the last few years, today the ESG commands and their partners "are working closely ... to develop an education and training cycle that will enable us to operate as a globally deployable, integrated command element available to execute Fleet Commander requirements", he added.

AMPHIBIOUS ROOTS AND BRANCHES

ESG 2 was preceded by Amphibious Group (PHIBGRU) 2, which was established as a command intended to administer the 'man, train, equip' functions but also to provide amphibious warfare command and control (C2). In the latter context, PHIBGRU 2 deployed for Gulf War operations in 1991 and 2003.

"The shift to an ESG in 2006 was a nod to an operationalisation that needed to occur," said Rear Adm Katz. "It's important that, as a navy, we keep adapting to meet the current challenges of the security environment."

During his time in post, Rear Adm Katz will oversee continuing adaptation of

ESG 2. "We are working towards a model of operationalisation that will take place in two phases. Similar to what US Second Fleet recently completed, ESG 2 will first achieve initial operational capacity (IOC) and then eventually full operational capacity (FOC)."

"Moving from IOC to FOC will require additional manpower support, and we are working through this now," the admiral explained. "We have identified and prioritized billets, and we are developing a training cycle and continuum that will certify our staff as FOC in the next year or so." Beyond this, he continued, the ESG will then enter a cycle of periodic recertification. "A big challenge we face will be the mindset shift from force generation to force employment, as well as ensuring we are not leaving our commands without the subject matter expertise and advocacy needed for us to employ these units operationally." "We cannot divest ourselves of the advocacy piece without first ensuring it is adopted elsewhere," the admiral explained. "So, this creates a bit of friction as we find ourselves moving in a new direction while still retaining and eventually turning over the force generation reins [to the subordinate commands]."

Within the overall transformation of USN – and, more widely, NATO – strategic and operational-level command structures, operationalising ESG 2 will give US Second Fleet and the Naples, Italy-based US Sixth Fleet additional flexibility, Rear Adm Katz explained. "I look at the co-ordination between [these] two fleets since Second Fleet was re-established, and how they've created – as Admiral James Foggo [then Commander US Naval Forces Europe-Africa and Commander JFC Naples] said, a few months ago – a seamless Atlantic Ocean." "Given the location of ESG 2, we can and should expect to report to both Fleet Commanders, and that means co-ordinating with each of those staffs I can imagine that, in the future, we'll participate in exercises led by US Second Fleet and by JFC Norfolk."

More broadly in strategic and operational terms, Rear Adm Katz noted that the very nature of amphibious warfare also is evolving. "The role of the amphibious force is changing with the nature and speed of warfare," he said. Although large-scale, aggregated amphibious landings may be less likely, the "core mission of putting marines and their capability ashore in support of the Fleet Commander is still very relevant."

What may change, the admiral continued, is that “the forces we employ in support of that mission will likely grow smaller, faster, and lighter.” In this context, he said, “We are currently exploring the applicability of emerging concepts, such as Expeditionary Advanced Base Operations (EABO) and Distributed Maritime Operations (DMO).”

The move towards using lighter, faster, and more distributed force packages underlines the need to improve C2 integration. Across NATO currently, C2 integration of amphibious units at task group and task force levels is an increasingly important area of command and operational focus. This is reflected in developments at ESG 2. In September 2020, ESG 2 began a new staff training round, designed to enable the staff to “learn how to conduct deliberate planning and develop the administrative products needed to [conduct C2 of] multiple task groups or a large Amphibious Task Force (ATF) in support of operational requirements beyond traditional amphibious operations,” said Rear Adm Katz. Defining the function and role requirements in such training is something ESG 2 is working on in partnership with its sister ESGs in San Diego and Japan.

INTERNATIONAL PARTNERING

US amphibious forces also partner and integrate with other countries around the world – both those with and without amphibious forces.

ESG 2's Bataan amphibious ready group (ARG) recently returned from an extended deployment across the US Second, Fifth, and Sixth Fleet AORs. The ARG included: the Wasp-class LHD USS *Bataan*, the San Antonio-class LPD USS *New York*, and the Harpers Ferry-class LSD USS *Oak Hill*; the 26th Marine Expeditionary Unit (MEU) and Amphibious Squadron 8; and embarked elements from Tactical Air Squadron 22 and

Naval Beach Group 2 and its subordinate commands.

During the seven-month deployment, ARG force elements worked with Saudi Arabian and United Arab Emirates forces in the Gulf; Albanian, French, and Italian forces in the Mediterranean Sea; and Bulgarian, Georgian, Romanian, and Turkish forces in the Black Sea. *Oak Hill* conducted the deployment to the Black Sea, where it worked alongside the USN's DDG 51 Flight II Arleigh Burke-class destroyer USS *Porter* – one of four DDGs homeported in Rota, Spain under the USN's Forward Deployed Naval Forces – Europe (FDNF-E) programme.

“We always learn something new when we work with our allies and partners,” said Rear Adm Katz. The current global Covid-19 pandemic has impacted the type of integration with allies that can take place during such deployments. However, the admiral explained, “ships can still come together to conduct manoeuvring exercises at sea to practice some of the bread-and-butter skills of the surface community.

Oak Hill's deployment to the Black Sea demonstrated the flexibility amphibious ships bring to operations across the Euro-Atlantic theatre. *Oak Hill* also has worked with Romanian forces previously, but outside of the Black Sea: during the ‘BALTOPS 2018’ exercise in the Baltic Sea, the LSD embarked Romanian Naval Infantry Battalion forces.

Across the Euro-Atlantic theatre, Rear Adm Katz explained, amphibious forces play a key role because they are flexible, manoeuvrable, and scalable, and allow commanders to launch forces ashore from the sea at the time and place of choice. What he referred to as ‘the Blue-Green team’ “can be dispatched to fill a multitude of roles, not to mention the fact that these forces do not require basing or overflight support”.

BLUE-GREEN INTEGRATION

Of course, effective integration of the USN and USMC amphibious force components is critical to that force delivering effect.

“We have several Marines who are a part of the ESG 2 staff,” said Rear Adm Katz. “This naval integration of our own provides us with the insight to better understand the ‘ins-and-outs’ of how the ‘Green’ side of the ARG-MEU team works.”

Rear Adm Katz said the USMC and the USN are looking to integrate more closely still, with the ESGs playing a central role. In February 2020, for example, USN and USMC forces worked together at the ‘Maritime Pre-positioning Force Exercise’ (MPF EX) in Florida. The exercise, he explained, provided “a unique States-side opportunity to practice the offload of an MPF ship that would ordinarily supply Marine forces ashore.” Marine Expeditionary Brigade personnel may also be integrated into ESG 2's current staff training period, to provide realism and insight into how the USN and USMC force elements would conduct deliberate planning together, Rear Adm Katz added.

Such ‘Blue-Green team’ integration is also evident across both individual NATO member states and the alliance collectively. One emerging collective capability concept is the NATO Amphibious Leader Expeditionary Symposium (NALES), designed to improve amphibious C2 integration between ATGs and ATFs and between US and allied amphibious forces. The NALES C2 construct, which was first demonstrated on ‘BALTOPS 2019’, “is incredibly important because it's a deliberate and co-ordinated effort with our allies to increase [amphibious] training and proficiency within the NATO realm,” said Rear Adm Katz. Integration concepts like NALES not only present opportunities for collective training but also for participating partners to learn from each other in how best to deliver such integration.

From the USN's perspective regarding improved integration with allies, Rear Adm Katz noted that the navy will “continue to seek every opportunity to work with our allies and partners”. “There will always be more exercises that we'd like to participate in than we have the capacity to do so, but it's important that we continue to show up when we can.” **A**

Note: Dr Lee Willett is an independent writer on naval and maritime matters



USS Hershel “Woody” Williams (ESB4) pulls into Naval Station Rota, Spain during a routine logistics stop, 9 Sept, 2020. This ship is on its inaugural deployment in the US Naval Forces Europe-Africa area of responsibility.



The use of inexpensive drones to offer tactical advantage has been repeatedly demonstrated particularly at the small unit level. The US Marines selected the InstantEye, a commercially available system, for its initial Squad UAV.

UAVS EVOLVE TO MEET THE CHANGING MISSION

Unmanned aerial vehicles can be employed from the smallest to largest military formations, to meet a developing range of mission profiles.

By Stephen W. Miller

The Unmanned Aerial Vehicle (UAV) is influencing the conduct of ground warfare much as the initial introduction of the airplane did in World War I. Just as the flimsy balsa and fabric biplanes provided a new and, to those in the trenches, a seemingly all encompassing perspective of the ground battlefield so too does the threat of the UAV. Coupled with today's technologies such as advanced high resolution cameras, on-board navigation, and digital data-links the UAV offers real-time information to its user far beyond the line-

of-sight. The new found application of the UAV on the front lines is partly possible due to the introduction of smaller air platforms but it is equally the result data digitalisation that allows real-time local control and presentation of video imagery to soldiers even in austere environments.

In the last decade the UAV has evolved from simply an information gathering asset to a lethal enabler as it has been coupled with massed area indirect fire weapons like multiple launch rocket systems or precision guided ordnance. The deadly effect of this combination was

dramatically demonstrated in the Ukraine when on 11 July 2014 Russian BM-21 Grad rocket artillery executed a mass attack on Ukrainian mechanised battalions assembling outside Zelenopillya after they were located by UAVs. US Army Colonel Liam Collins and Captain Brandon Morgan pointed out in their 22 January 2019 article, *King of Battle: Russia Breaks Out the Big Guns*, published in AUSA.org that "Russia [has] mastered integrating network of UAVs, forward observers, and direct direction centres directly with rocket and cannon batteries." In addition, "the Russian Army

is fielding its artillery [and associated UAV assets] directly to manoeuvre battalions, providing maximum responsiveness when short windows of opportunity present themselves...This unparalleled responsiveness allows forces to quickly fix and destroy an opposing force with minimal need for a lengthy decision-making process or complex schemes of manoeuvre”.

The use of massed artillery has been a mainstay of Russian tactics for nearly a century. The Katyuscha multiple rocket launcher inflicted similar destruction on German forces in 1944. However, it has become even more deadly today with the critical difference being the presence of the UAVs.

OMNIPRESENCE

The UAV appears to offer what every soldier and commander since Genghis Khan has wished, the ability to see beyond the next hill or tree line. To gain real-time information on the opponent's troops, guns, and equipment and their dispositions day or night. The platform that best provides these insights to the local commander are not the high flying persistent platforms like the Northrop Grumman RG-4 Global Hawk operating at up to 60,000 feet (18,000 metres) but rather the smaller tactical UAVs that operate just above the battlespace.

The tactical UAS operates forward on the battlefield often from undeveloped sites with minimal supporting facilities. These platforms fall within the US classifications of Group 1 – with a maximum weight of 20lbs (9kg) and operating altitude below 1,200ft (366m); Group 2 – weighing up to 55lbs (25kg) and 3,500ft (10,670m) altitude; and Group 3 at up to 1,320lbs (600kg) and 18,000ft (5,500m). Key differentiators are if the platform is fixed wing or rotary and if it is hand or catapult launched or conventional take-off. These, however, look at the UAV from a technical aspect when perhaps a clearer approach to understanding their contribution is to review them based on the unit level at which each is actually employed.

SQUAD UAVS

The UAV used at the squad and team level faces significant design challenges. It must be simple to operate, easy to carry, require minimal support, and yet be rugged and reliable. Their task is straight forward; to avoid surprises by preceding the squad and uncovering what is around the next

bend, in the tree line, or even in a building. Referred to as Micro or Nano UAVs, the smallest and likely the most utilised is the Black Hornet from FLIR Systems. This palm size rotor craft has a 25 minute flight time and can send encrypted infrared and colour high definition images and video up to 2km. Navigation is simplified by using Global Navigation Satellite System (GNSS) with Vision Based Navigation that operates even in Global Positioning System (GPS) denied or indoor environments. Black Hornet has been widely adopted with over 19 NATO militaries as well as Indian forces. Another Niño is the AeroVironment Snipe, a foldable miniature (5oz) quadcopter with up to 30 minutes endurance.

The US Marines selected a redesign of a commercial UAV for its squads, fielding the Instant Eye. The small quad-copter is offered in several models with the Mark-3 GEN5-D1 being the smallest in the family at 250grams. Tom Vaneck, vice president at Instant Eye Robotics shared: “The need

for a discrete aerial platform that can operate close to a target undetected is of critical importance. The Mark 3's small size, low audible and visual signature assures this.” The US Marines dedicate one squad member to its operation.

COMPANY TO BATTALION UAVS

For larger formations UAVs and deployed with greater range, endurance and more sensor options. These then require several soldiers to manpack and operate them. Many of these fixed wing models forgo any need for a launcher and are simply thrown into the air by a single person. These UAVs resemble recreational model airplanes although with much more sophisticated navigation, sensor packages and communication data links. The AeroVironment RQ-11 Raven is representative of this class. The platform comes in a single soldier portable carry case and is assembled on site. Hand launched it can remain aloft for up to 90



Small hand-launched UAVs provide the forward patrol the ability to uncover a danger well before they come upon it, thereby allowing them to take action on favorable terms. Here a Peoples Liberation Army patrol launch a small quadcopter in an exercise.

ChinaMil

SCHIEBEL



over 10 000 maritime flight hours

over 2 000 deck landings

operated from 30+ ships

powerful heavy fuel engine

EXTENSIVE
SHIPBOARD
EXPERIENCE

UNMANNED MARITIME ISR

CAMCOPTER® S-100
UNMANNED AIR SYSTEM



The Russian Army has embraced the tactical use of UAV introducing it as an organic element of their Brigade structure. They have demonstrated their ability to effectively integrate the UAV and artillery to deadly effect. Here an Eleron -3 UAV which is widely used in Syria prepares for catapult launch.

minutes typically flying about 500ft (150m) above ground with its electric push motor propeller make for quiet flight. Its standard sensor package includes day colour and thermal cameras on a 360 degree gimbal and when fitted with a Harris Small Secure Digital Data Link it permits beyond line-of-sight communications.

Alternately vertical take-off and landing (VTOL) UAVs have become increasingly fielded at this level. Quad-Copters have the advantage of requiring little space to take-off or land making them ideal for use in forests, urban areas or to be carried and operated from vehicles. The benefits of VTOL have become clear from actual field use with a number of fixed wing UAV firms now adapting hand-launched UAVs to vertical operation. They have also developed designs that seek to bridge the capabilities of the two configurations as shown in AeroVironment's Quantix RECON which incorporates a fixed wing/VTOL hybrid that takes off vertically but will fly horizontally.

BRIGADE TO DIVISION UAVS

A critical difference in the UAV supporting operations at this level is the need for significantly greater mission flight times, normally 18 to 24 hours allow which allows loiter time for constant surveillance of a target. Larger UAVs mean sensor payloads beyond just electro-optics to

include synthetic-aperture radar, foliage penetrating LiDAR, laser designators, and other packages. The Boeing Insitu trailer launched RQ-21A Blackjack with a 16ft (4.9m) wingspan carrying over 39lbs 18kg is an example that was first employed in Iraq in 2014. Another is the US Army Shadow tactical UAV which uses a runway. However, the Army has been looking at

moving to a replacement that does not require a prepared strip. Candidates being considered include the Martin UAV V-Bat and the Aerosonde Hybrid Quad by Textron, L3 Harris's FVR-90, and Arcturus UAV JUMP20. Operational user evaluations are ongoing in 2020.

RUSSIAN UAVS

The Russian Army was an early adaptor of UAVs for tactical reconnaissance employing its Strizj and Reys in the Russo-Georgian War in 2008 though with limited success due to their design. A major lesson learned from these and "subsequent operations in Syria and the Ukraine", according to Samuel Bendett of the Centre for Naval Analysis, was the importance of signature management: "This has seen Russian development of hybrid drone engines to ensure quiet operation by using electric/ petrol or variable performance petrol/ kerosene."

The Russian adoption of the UAV for tactical operations has been vigorous. Increasingly brigades have a UAV company with its platoons structured around each various UAV type and range. Extensive use has been made of the Granat series mini class and Orlan-10 short/mid-range UAVs in artillery spotting. These UAVs communicate directly to forward positioned artillery reconnaissance vehicles which then pass target data to



The hand-launched UAS has been widely adopted for use at the company and battalion since it has greater endurance and payload flexibility meaning it can operate deeper into enemy territory and remain on station longer. Here a US soldier throws out a Raven UAV.

USArmy



There is a clear move by armies to decrease its dependency on landing areas for tactical UAVs which limit the flexibility of their deployment. With this in mind, the US Army is evaluating a number of off-the-shelf VTOL UAVs. One of these is the uniquely design Martin V-BAT.

battery fire control centres. On the Ukraine battlefields this arrangement allowed targets to be quickly attacked by massed fires often within 20 minutes or less. The Russian Army has also used the Kronshtadt Group Orlan-3 equipped to jam radio RF signals and spoof cell phones against Ukrainian forces.

The Granat by IZHMAH Unmanned Systems is a fixed wing pusher propeller UAV that is catapult launched with a cruise speed of 48 knots (90km/h) and 70km range. It is used for reconnaissance and artillery spotting as well as SIGINT (signals intelligence), radio monitoring, direction, and collection. Two UAVs with transport containers, a ground launcher, charging/refuelling, and a KAMAZ4350 truck control station comprise a unit.

The Orlan-10 is fixed wing catapult launched with a maximum take-off weight of 36lbs (16.5kg) driven by a nose propeller. It can cruise at 60kts (110km/h) for 18 hours and are often used deploying two UAVs on missions with a third providing a signal relay. Its swappable payloads include various cameras in its stabilised pod as well as electronic warfare systems and radio relays. A unit includes 3 - 4 air vehicles, launcher/recovery systems, and ground

control vehicle.

One of Russia's primary UAVs is the Forpost, which fills roles similar to the US Army Gray Eagle MQ-1C from General Automics. Forpost is the Russian name for the Israeli Aircraft Industries (IAI) Searcher which they had imported but are now building in a Russianised 'R' version. It uses a local APD-85 engine and adds radar and EW capabilities within its increased 1,102lbs (500kg) payload. These tasks require UAVs with even greater endurance and payload capability yet are still capable of operating from more austere sites.

EVOLVING UAV MISSIONS

The UAV easily fits into the more traditional general intelligence gathering and fires targeting roles that had previously been undertaken by manned aircraft. However, it is increasingly employed to directly coordinate with ground manoeuvre forces. At the squad, platoon and company it is a revolutionary extension of the 'pointman' seeing further and offering a greater perspective.

This use was reportedly employed in a recent Russian armour force exercise in Tajikistan where it flew forward of the tanks reporting masked enemy positions.

This application dovetails with the Russian concept of an aggressive attack by ground forces and may be further facilitated by the Army's announced intent to acquire the lighter at 9lbs (4kg) and more mobile short-range Eleron-3 in an improved version equipped with IR and low-light cameras operating on a controlled or pre-programmed flight path and automatically returning from its mission.

The UAV has become increasingly important for intelligence gathering beyond the forward areas. This is particularly true as ground positioned weapon systems are becoming tasked for a range of new missions like suppression of air defences and identifying the location of other high value assets such as mobile command centres.

As evidenced by current conflicts in the Ukraine and Syria, the UAV is and will continue to be a presence on the battlefield. That actual presence, or even possibility of that presence, has altered the nature of ground warfare. The challenges now are in determining how to adapt tactics to both capitalise on the capabilities the UAV offers and to mitigate or overcome these same capabilities they may offer the enemy. **A**

TACTICAL RADIOS

AN ARMADA INTERNATIONAL SUPPLEMENT



ARMADA : THE TRUSTED SOURCE FOR DEFENCE TECHNOLOGY ANALYSIS

AR Booster Amplifiers Hit The Ground Running



Even Shock & Vibration Can't Rattle The AR-50 Tactical Booster Amplifier

It survived the toughest environments... 400G shock, 20G vibration, and passed the toughest J1TC Certification. The AR-50 operates perfectly every time, boosting your radio's power to 50 watts providing clear, dependable multi-communication networking. It operates from 30 to 512 MHz and works with all modern and legacy waveforms.



It's compact, lightweight, easy to use. Nothing stops it.
To learn more, visit us at www.arworld.us/tactical
or call 425-485-9000.





ESSOR, the European Software Defined Radio (SDR) project will be High Data Waveform (HDR WF) compliant with such architecture, thus offering the normative referential required for development and production of software radios in Europe.

TACTICAL RADIOS GUIDE 2020

The twelve months since *Armada's* 2019 Tactical Radios Compendium has witnessed energetic activity in the global tactical communications domain.

by Thomas Withington

Front cover: The Army Futures Command demonstrated its Radio Interoperability Capability - Universal (RIC-U) at the Aberdeen Proving Ground in May, 2019. It provides a voice bridge for tactical radios that will allow US forces to talk with allies during multi-national operations, yet still protect access to the Army's tactical network. (DVIDS)

INVISIO T7

First Headset to Perform in all Mission Scenarios

INVISIO T7
Over-the-Ear
Headset



**Submersible
and Rugged**

10 m submersion
12 000 m altitude



INVISIO Audio™

Hearing protection
and unparalleled
360° hear-thru



All Day Comfort

Less than 350 grams
Patent-pending
3D cushions



**Next Level
Flexibility**

3 interchangeable
wearing styles

Read more at www.invisio.com

INVISIO®



The British Army's Project Morpheus will allow new computers and radios to work with the architecture to deliver battle management for headquarters and tactical units.

Large-scale ongoing acquisitions continue in the United States and across several North Atlantic Treaty Organisation (NATO) and non-NATO members. Meanwhile, a resurgent Russia is embarking on a long-overdue modernisation of its army's tactical communications and Battle Management Systems (BMSs).

UNITED STATES

The US Army's Handheld, Manpack, Small Form Fit (HMS) programme retains its place as the leading tactical radio acquisition in North America. The programme is procuring new handheld and manpack Very/Ultra High Frequency (V/UHF: 30 megahertz/MHz to three gigahertz) radios for the US armed forces. A report published in early June on US defence acquisitions published by the Government Accountability Office (GAO), the US government spending watchdog, gave a snapshot of the programme's health to date.

Adjusting for inflation HMS development

costs have experienced an increase of over 133 percent from the estimated \$627.6 million outlined in 2004 at the programme's inception to the \$1.4 billion calculated by the GAO in August 2019. There is good news. The GAO calculates that overall acquisition costs have reduced by almost 24 percent from \$10.9 million to \$8.3 million. Unit costs have remained the same at circa \$40,000 per radio in spite of estimated total radio procurements falling from 328,674 in May 2004 to 271,202 in August 2019. Yet the overall HMS initiative is by not out of the woods. Several testing and production milestones are still on the horizon before the HMS roll-out is complete, possibly by the end of this decade.

EUROPE

Beyond the US, other significant acquisitions are ongoing elsewhere in the NATO sphere. The Heer (German Army) SVFUA (Streitkräftegemeinsame verbundfähige Funkgeräteausstattung/Joint Armed Forces

Radio Equipment) programme is furnishing the force with the MOTAKO IP (Internet Protocol) BMS which uses the army's MOTIV software. MOTAKO and MOTIV will be carried across the army's new Rohde and Schwarz Soveron family V/UHF radios.

Like the Heer, the British Army is following a dual track of acquiring a BMS and new radios via the Project Morpheus initiative. This takes the army's existing Bowman BMS/communications architecture as the building block for its new communications and BMS. Morpheus uses an open architecture approach to allow new computers and radios to work with the architecture as and when they are acquired. Competitions are expected to be held by the United Kingdom's Ministry of Defence to acquire new radios to replace legacy transceivers supporting Bowman. Initial plans had called for the Morpheus architecture to be deployed from 2023. Whether this date is feasible with a contracting UK economy on the horizon, courtesy of the COVID-19 pandemic,

SEE THE BATTLESPACE FROM A BETTER ANGLE.

ALL OF THEM.

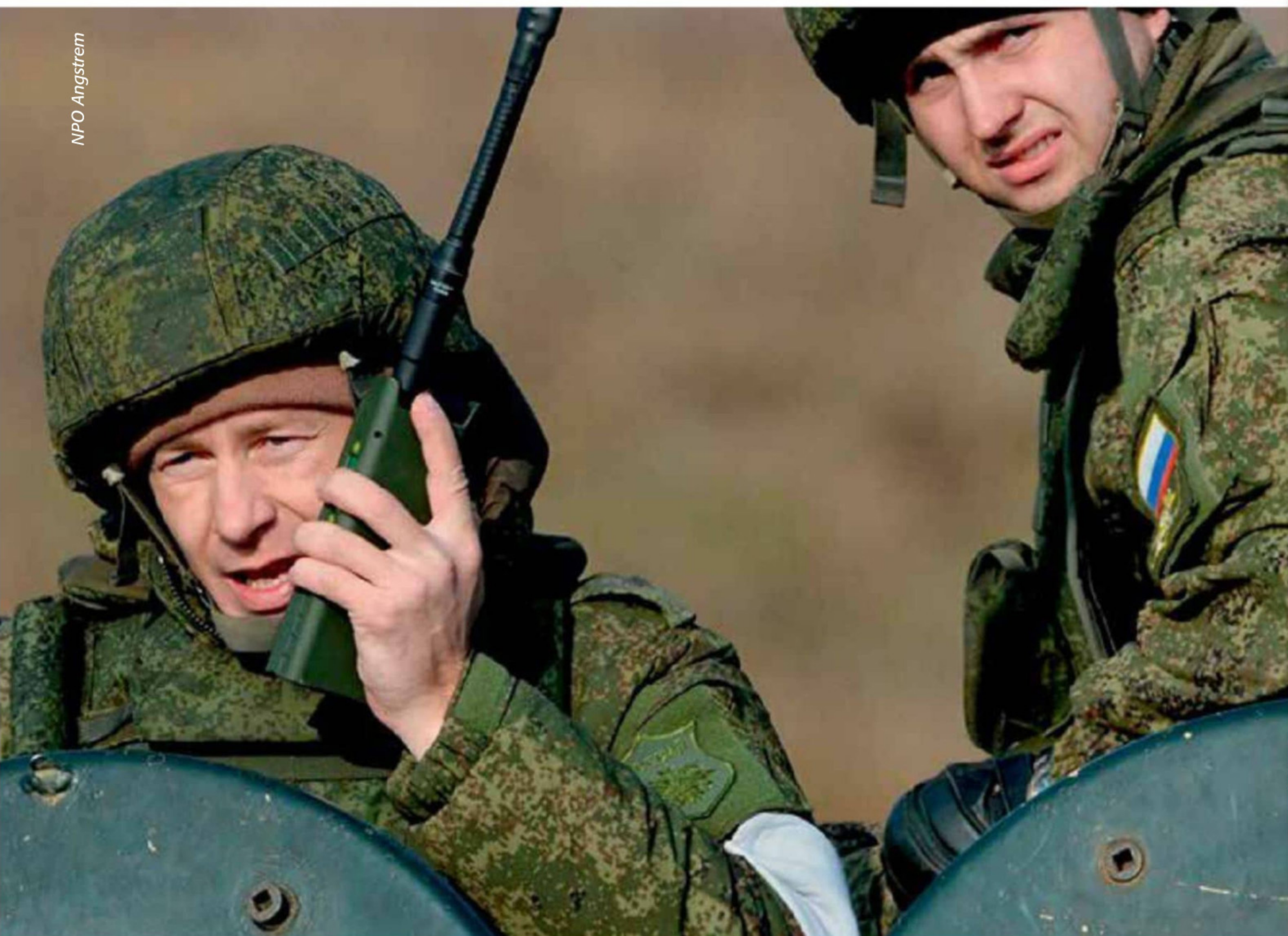


Keeping you connected with 360-degree situational awareness is critical, now more than ever. For dismounted warfighters on the ground to pilots supporting from the sky, Viasat's BATS-D AN/PRC-161 radio brings a common operational picture to those who need it most — even in highly contested environments.

BATS-D — the world's only handheld Link 16 radio.

Learn more at viasat.com/batsd-4

Viasat 



Russian Army is taking delivery of NPO Angstrom's R-187-P1E AZART handheld radios.

remains to be seen.

Tactical radio developments in Europe are not just about the hardware. The pan-European ESSOR (European Secure Software Defined Radio) high data rate waveform could help to improve command and control, and situational awareness among deployed coalition forces. The ESSOR partner nations and companies include Finland (Bittium), France (Thales), Germany (Rohde and Schwarz), Italy (Leonardo), Poland (Radmor) and Spain (Indra). The ESSOR waveform will use UHF frequencies of 225MHz to 400MHz and accommodate up to 200 nodes per network. It should be ready for porting into radios from 2021. Coincidentally, both Finland and Sweden are in the process of renewing their tactical radios with acquisitions of new V/UHF sets from Elbit and Bittium.

France, meanwhile, will roll out ESSOR on its new Thales CONTACT tactical radio family furnishing the country's armed forces.

RUSSIA

The Russian Army is performing an ambitious BMS and communications modernisation. Launched in 2009 these efforts have seen the force taking delivery of new NPO Angstrom R-187VE vehicular/fixed base tactical radios and R-187-P1E Azart handheld radios. The former is used by headquarters and mounted forces, with the latter utilised by squad/platoon commanders. Both radios cover V/UHF wavebands of 1.5MHz to 2.5GHz. These radios will carry voice and data, notably traffic relevant to the army's Acacia-M BMS. This is thought to equip the force's manoeuvre elements from

operational to tactical levels. An equivalent for airborne forces, dubbed the Andromeda-D is being introduced in Russian airborne forces.

OUTLOOK

While the tactical communications market has remained buoyant in recent years, there is no guarantee that this trend will continue. Any global economic slowdown resulting from the COVID-19 pandemic will almost certainly make its presence felt in defence budgets around the world. Tactical communications could feel the brunt of these reductions should lawmakers believe these to be relatively 'risk free' cost centres to cut to safeguard the big ticket platform acquisitions so beloved of politicians. **A**



Sat-Com designs and manufactures state of the art military communication equipment, systems and add-on accessories.

*Our multiband radio systems provides seamless secure communication across the HF, VHF and UHF band in a **single radio system** in **various configurations** simplifying training, implementation, operation, mission planning, maintenance and logistics which saves the end user lots of money.*

Our multi-band, multi-role radios enable operators to communicate with any other land, sea or airborne radios for ultimate mission flexibility.

All of our products have been designed and tested to comply with the MIL-STD 810G specifications.

Our products facilitate uncompromised communications between all forces in full COMSEC, TRANSEC, and LINKING modes.

E-MAIL:
sales@sat.com.na

WEBSITE:
<https://www.sat.com.na>



**“VERSATILE MILITARY
COMMUNICATIONS
SYSTEMS”**

TACTICAL RADIOS LISTINGS

PRC-9651 V/UHF Handheld

Aselsan



Power:
Frequencies/waveforms:

Security:
Weight:
Notes:

Up to 5W in CNR, A-CNR, NBNR modes, 4W in SK2 mode, 25W in air-to-ground mode
30MHz to 512MHz in 1,300 preset channels, software architecture supports Aselsan's CNR, SK2 VHF, 5100, SK2 UHF, A-CNR, NBNR waveforms and V/UHF-AM. Built-in national crypto, frequency hopping, burst data transmission
1.4kg
SDR designed to provide continuous audio, data and video communications for the tactical at up to 64kbps in full duplex IP packet data switching service mode.

PRC-5712 Soldier Radio

Aselsan



Power:
Frequencies/waveforms:
Security:
Weight:
Notes:

125mW
380MHz to 400MHz, 99 pre-set channels
Encryption optional, whisper function
less than 370g with antenna, NiMH battery
Provides voice and data comms in talk groups of up to five with others monitoring, range up to 1km in rural terrain. Full duplex capability enables conferencing and VOX.

PRC-5433 V/UHF Handheld

Aselsan



Power:
Frequencies/waveforms:

Security:

Weight:
Notes:

5W max
30MHz to 512 MHz, wideband and narrowband networking waveforms, proprietary SK2 V/UHF. Fixed frequency operating band 225MHz to 512MHz, frequency hopping operating band 50MHz to 512MHz.
COMSEC & TRANSEC measures include built-in hardware based encryption, frequency hopping, red/black data separation, emergency clear, user access control with Crypto Ignition Key (CIK).
1kg with battery, without antenna
New Software Defined Networking Radio (SDNR) for continuous audio, high speed data and video comms & situational awareness. Built-in GNSS, 13 MP camera, 1.77 inches Colour RGB TFT Display

PR9560

AT Electronic and Communication International



Power:
Frequencies/waveforms:

Security:
Weight:
Notes:

0.5/2/4W
30MHz to 87.975MHz. Combat Net Radio (CNR), Voice Relay Network (VRN) and Packet Radio Network (PRN) waveforms
AES 256/Customised COMSEC and ECCM
≤ 0.6kg (with 3800mAh battery)
PR9560 is intended for land forces such as infantry, forward observers, snipers, special forces and anti-terrorist units, and can be deployed at the platoon or company level. CNR's primary role is voice or data transmission in battlefield via point to point/ point to multi-points communication. VRN extends voice communication distance by chaining. PRN mainly serves as data transmission for man to machine and machine to machine in battlefield.

PRR 1M

AT Electronic and Communication International



Power:
Frequencies/waveforms:
Security:
Weight:
Notes:

100mW EIRP max
2.4GHz, spread spectrum, 240 operating channels, eight selectable nets
Time hopping, frequency hopping and OFDM resists interception, jamming.
1kg
PRR designed for operation within groups of up to 30 users allows for full duplex communication in ad-hoc digital networks, needs no additional infrastructure. Can link to another network through transceiver connected via USB.

PRC-2090 HF manpack transceiver

Barrett Communications



Power:
Frequencies/waveforms:

Security:

Weight:

Notes:

30W/10W PEP (Selectable) output power
1.6MHz to 30MHz/ Modes: J3E (USB, LSB), H3E (AM), J2A (CW), J2B (AFSK) modes. Digital Voice: 600/700, 1200, 2400Bps (MELP/TWELP)
Encryption standards: AES256 & DES56. Frequency Hopping: 5 or 25 hops per second
3.90kg (5.2kg with Barrett high performance Li-ion Battery with built in charge controller)
2G and 3G ALE options MIL110, 3G (STANAG) & CLOVER data options. PRC-2091 is a 12.85kg tactical mobile transceiver with a vehicle docking station and extra power (125W setting). PRC-2092 is a 14.3kg tactical base station with extra power (125W setting) and a mains power supply.

PRC-2080+ Tactical VHF radio

Barrett Communications



Power:
Frequencies/waveforms:

Security:

Weight:
Notes:

5W hand portable, 25W manpack, 50W mobile, base station & rebroadcast
30MHz to 88MHz, 25kHz channel resolution, 10 channels
Multiple levels of encryption and frequency hopping security available: Analogue Voice - Fixed Frequency, Digital Unencrypted Data - Fixed Frequency, Digital Encrypted Voice - Fixed Frequency (DEFF), Digital Encrypted Voice - Frequency Hopping (DEFH), Digital Encrypted Voice - Free Channel Search (DEFCS), Digital Encrypted Data - Fixed Frequency, Digital Encrypted Data - Frequency Hopping
1.3kg with battery pack
Military grade portable communication transceiver specifically designed for tactical applications. It is designed to meet complete immersion, vibration, drop to MIL-STD 810G. Available in both handheld and man-pack forms.

PRC-2081+ – 25 W VHF Manpack

Barrett Communications



Power:
Frequencies/waveforms:
Security:

Weight:

Notes:

25W
30MHz to 88MHz, 25kHz channel resolution, 10 channels
Multiple levels of encryption and frequency hopping security available: Analogue Voice - Fixed Frequency, Digital Unencrypted Data - Fixed Frequency, Digital Encrypted Voice - Fixed Frequency (DEFF), Digital Encrypted Voice - Frequency Hopping (DEFH), Digital Encrypted Voice - Free Channel Search (DEFCS), Digital Encrypted Data - Fixed Frequency, Digital Encrypted Data - Frequency Hopping
7.7kg with backpack frame and 16.8V 10 Ah Li-Ion battery pack
PRC-2081+ 25 Watt Man-pack upgrades the PRC-2080+ transceiver with increased power and communication range. Standard package includes: man-pack dock, battery pack, AC/DC charger, collapsible section whip, tape whip antenna, handset, framed backpack.

PRC-4090 HF Tactical Manpack Transceiver

Barrett Communications



Power:
Frequencies/waveforms:

Security:

Weight:

Notes:

Tx 30W/10W PEP (Selectable), Rx current consumption 250mA
1.6MHz to 30MHz/ Modes: J3E (USB, LSB), H3E (AM), J2A (CW), CF (Custom Filter) ISB (Data) modes. Digital Voice: 600/700, 1200, 2400 Bps (MELP/TWELP)
Encryption Standards: AES256 & DES56. Frequency Hopping: 5 or 25 hops per second
2.95kg (4.55kg with BB2590 Battery / 5.00kg with Barrett high performance Li-ion Battery with built in charge controller)
2G and 3G ALE options, MIL110, 3G (STANAG) & CLOVER data options. Released September 2019. PRC-4091 is a 9.35kg vehicle mobile version with extra power (additional 125W & 150W settings) and a docking station with anti-vibration mounting. PRC-4092 is an 11.15kg base station with extra power (additional 125W & 150W settings) and a docking station and AC mains power supply.

// The ability to design, develop and implement waveforms and cryptology myself allows me to create a national solution. //

SOVERON

TURNING MILITARY NETWORKS INTO A SOVEREIGN TERRITORY

Rohde & Schwarz' capabilities for system design, development, production and integration of secure communication architectures and networks are summarized under the SOVERON® concept. SOVERON® takes national interests into account and contributes to digital sovereignty and technological independence.

www.rohde-schwarz.com/soveron

ROHDE & SCHWARZ
Make ideas real



TACTICAL RADIOS LISTINGS

4090 HF Manpack Transceiver

Barrett Communications



Power:	Tx 30W/10W PEP (Selectable), Rx current consumption 250 mA
Frequencies/waveforms:	1.6MHz to 30MHz/ Modes: J3E (USB, LSB), H3E (AM), J2A (CW), CF (Custom Filter) ISB (Data) modes. Digital Voice: 600/700, 1200, 2400 Bps (MELP/TWELP)
Security:	Encryption Standards: AES256 & DES56. Frequency Hopping: 5 or 25 hops per second
Weight:	2.95kg (4.55kg with BB2590 Battery / 5.00kg with Barrett high performance Li-ion Battery with built in charge controller)
Notes:	2G and 3G ALE options, MIL110, 3G (STANAG) & CLOVER data options. Released September 2019.

4050 HF SDR Transceiver

Barrett Communications



Power:	Tx 150W PEP (with 24V supply), current consumption 350MA standby (muted)
Frequencies/waveforms:	1.6MHz to 30MHz, J3E (USB, LSB), H2B (AM), J2A (CW), CF (Custom Filter) and ISB (data option).
Security:	5 or 25 hops per second frequency hopping
Weight:	Undisclosed
Notes:	Provides secure telephone, data and email services, uses 2G and 3G ALE standards, can operate in temperatures of -30°C to +70°C.

BLD100 Tactical Radio

Benelec



Power:	1W to 3W
Frequencies/waveforms:	VHF 30MHz to 88MHz, full civilian CTSS squelch, standard military 150Hz sub-audio tone
Security:	external encryption modules
Weight:	0.295kg including battery & antenna
Notes:	Designed for platoon communications, BLD100 is a fixed frequency handheld radio family in IP67 housing, complies with Mil Std 810C, D, E & F. Features built-in data modem.

BL350U UHF FM tactical radio

Benelec



Power:	2W to 4W selectable
Frequencies/waveforms:	380MHz to 420 MHz, up to 128 channels with 12.5Hz or 25Hz spacing
Security:	AES 256bit encryption optional
Weight:	0.285kg inc 1700mAh Li-ion battery
Notes:	Up to 14 hour battery life, IP54 water & dust protection, priority channel & talkback scanning, 1,200/2,400 baud modem, programming via USB, voice operated transmission (VOX).

Tough SDR Handheld

Bittium



Power:	5W (PEP)
Frequencies/waveforms:	30MHz to 2500MHz/ Bittium Narrowband Waveform, Bittium TAC WIN Waveform with data throughput up to 25Mbps, ESSOR High Data Rate Waveform, supports porting of legacy and national waveforms
Security:	Red/black separation, secured boot, tampering detection & response, emergency erase, COMSEC and TRANSEC allowing implementation of national algorithms, Application Sandbox for customer applications
Weight:	950g with battery
Notes:	SDR-based tactical handheld radio for individual soldiers, such as squad or platoon leader, providing a uniquely wide frequency range. With flexible configuration options and routing networks, supporting 'thousands' of radios in one network. Built-in GNSS, camera, transfective TFT LCD (320 x 426) display

Tough SDR Vehicular

Bittium



Power:	12V DC to 32V DC according to MIL-STD-1275E
Frequencies/waveforms:	30MHz to 2.5GHz. Bittium Narrowband Waveform, Bittium TAC WIN Waveform, ESSOR High Data Rate Waveform. Supports also porting of legacy and national proprietary waveforms.
Security:	Red/Black separation, secured boot, tampering detection and response, emergency erase, COMSEC and TRANSEC allowing implementation of national algorithms, application sandbox for customer applications.
Weight:	15kg
Notes:	The Tough SDR Vehicular forms part of Bittium's Tough SDR product line which also includes the Tough SDR Handheld radio; both of which are being supplied to the Finnish armed forces.

PRQ-7 Combat Survivor Evader Locator (CSEL)

Boeing



Power:	5W (PEP)
Frequencies/waveforms:	VHF, UHF, satcom
Security:	TNSA certified encryption and decryption of OTH and LOS messages
Weight:	0.9kg
Notes:	When activated by the Isolated Person (IP), 6-channel CSEL handheld automatically transmits the IP's GPS location and identification and enables the IP and rescue centres to exchange messages.

2110/2110M Man-pack (Military)

Codan Radio Communications



Power:	5W or 25W selectable, 50 percent duty cycle with over-temp protection.
Frequencies/waveforms:	1.6MHz to 30MHz Tx, 250kHz to 30MHz Rx, all in 10Hz steps
Security:	CES-128 & AES-256 voice encryption & internal frequency hopping options. CES-128, 97 x programmable 16-digit keys, 4-digit PIN. AES-256, 256 x programmable 256-bit keys.
Weight:	2.9kg or 5kg with 8Ah NiMH battery, 0.3kg smart handset
Notes:	Features 2nd Gen digital voice technology, integrated GPS receiver, over 60 hours battery life, 3G ALE (STANAG 4538) including FLSU, HDL, LDL, CAST (Codan Adaptive Signalling Technology), MIL-STD-188-141B ALE, MIL-STD-188-110A/B, STANAG 4539, 75bit/s to 9600 bit/s.



BERNIER
info@bernier.tm.fr
+33 1 60 84 21 40

OUR EXPERTISE...

CONNECTORS IN HARSH ENVIRONMENT

RADIOS – INTERCOMS – CRYPTED DATA – OPTRONIC DEVICES – FUTURE SOLDIER – RUGGEDIZED COMPUTERS – TACTICAL EQUIPEMENTS

www.bernier.tm.fr



CMASD CONNECTORS
The advantage of the CMA connector in a small size factor for wearable functions and radio systems.



MMC CONNECTORS
The more compact size connector evolution, low profile, only 3mm depth inside the box and 25mm height when connected up to 24 contacts !



CMA-USB type C
Perpetual innovation on custom designs including new electronic functions in connectors



LET'S SET TOGETHER THE SUITABLE DESIGN FOR YOUR PROJECT !

TACTICAL RADIOS LISTINGS

Sentry-H 6110-MP

Codan Radio Communications



Power:
Frequencies/waveforms:

Security:

Weight:
Notes:

30W RF± 1dB (two-tone or voice), user-programmable in 1W steps (low/medium/high) 1.6MHz to 30MHz Tx, 250kHz to 30MHz Rx with up to 1,000 channels. Codan 2400 bit/s robust data modem waveform, FED-STD-1045; MIL-STD-188-141B; STANAG 4538 3G ALE waveforms, MIL-STD-188-110A/B (STANAG 4539) data capability with data rates up to 192kbps data waveforms, CCIR 493-4 proprietary and open standard waveforms, TWELP 2400bit/s, 1200bit/s, 600bit/s, 480bit/s, 300bit/s MELPe (STANAG 4591) 2400bit/s, 1200bit/s digital voice waveforms.
AES-256 digital voice and data (256 keys, direct entry and programmable via Codan KMS/KFS & USB memory stick), CES-128 voice (97x16-digit keys, direct entry and programmable via Codan KMS/KFS & USB memory stick, 4-digit session PIN)
Weight: > 5kg inc battery
Integrated GPS antenna and receiver built-in to the front panel and optional 2320 Handset with GPS, GLONASS and BEIDOU navigation systems supported.

Sentry-V Handheld VHF Radio

Codan Radio Communications



Power:
Frequencies/waveforms:

Security:

Weight:
Notes:

up to 5W
Optional bands: 30MHz to 88MHz or 136MHz to 176MHz with 1,024 channels. Supports 12.5kHz / 25kHz channel spacing, analog FM, DVOA, P25 conventional/trunking & DMR
Optional AES 256 encryption, over-the-air zeroize to disable compromised radios
0.58kg with Li-ion battery
Features built-in radio repeater, GPS positioning & report, shows group member positions on screen, text & image transmission, voice recording, Bluetooth smartphone link. Canned or open text messages can be sent between radios, up to 128 characters.

PRC7700H manpack

Datron



Power:
Frequencies/waveforms:

Security:

Notes:

100W
TX: 1.5MHz to 30 MHz (10Hz steps), RX: 100kHz to 30MHz/ waveforms, modulation types, wide & narrow bands, and communications security can be updated via software
Integrated high-level encryption option with front panel quick-connect key fill port and zeroize button
IP-addressable, digital, ALE-capable HF manpack SDR combining DSP-IF circuitry and powerful microprocessors, also suitable for mobile, rack-mounting or desktop use. Can be used as a man-pack or vehicle-mounted set. Features an internal GPS receiver with external TNC antenna connector mounted on the front panel.

PRC1099A HF tactical manpack

Datron



Power:
Frequencies/waveforms:
Security:

Weight:
Notes:

5W to 20W, PEP or average, man-pack; 5/20/100/400W in mobile configuration. Capable of continuous duty service at 5W.
1.6MHz to 30MHz, 10Hz Steps, 100 programmable channels
optional add-on
4.4kg plus 2.4kg battery pack
Rugged (MIL-STD-810), immersible man-pack with internal automatic antenna tuner, remotely controllable and with FED-STD-1045A ALE capability. Can be used as core of high-power vehicle system based on core man-pack, which retains emergency "jerk-and-run" capability.

PRC2100V

Datron



Power:
Frequencies/waveforms:
Security:

Weight:
Notes:

500mW to 10W (Manpack) & 500mW to 75W (mobile or base station)
30MHz to 88MHz, 100 programmable channels
Embedded ECCM, COMSEC for voice and data. Full- or partial-band frequency hopping, digital encryption, and internal GPS receiver with external TNC antenna connector
4.2kg plus 1.8kg battery pack
Interoperable in all encryption and hopping modes with the HH2100V handheld radio, can be used in a network to provide base station, vehicle, man-pack, or retransmit capabilities.

PRC1077 VHF tactical manpack

Datron



Power:
Frequencies/waveforms:
Security:
Notes:

500mW, 2W and 5W selectable
30MHz to 88MHz in 25kHz steps, 10 programmable channel presets
encryption module, KRC1077, high-security voice scrambler optional
Interoperable in FM clear-voice mode with Datron Squad Radio family and most other single-channel 30MHz to 88MHz VHF/FM radios using a 150Hz tone-squelch or CTCSS squelch system

HH2100V Spectre-V tactical VHF handheld

Datron



Power:	Up to 5W output power in three programmable steps
Frequencies/waveforms:	30MHz to 87.975MHz, 100 programmable channels
Security:	Full- or partial-band frequency hopping and digital encryption, 2 COMSEC modes (40bit and 64bit)
Weight:	1.2kg with battery
Notes:	Meets MIL-STD-810 for reliable operation in harsh environments, accurate position and time-of-day capability is afforded by the embedded GPS receiver, offers short messaging

HH7700

Datron



Power:	500mW, 2W and 5W, user selectable
Frequencies/waveforms:	30MHz to 88MHz, 2,320 channels at 25kHz spacing with 15 programmable presets
Security:	optional embedded voice scrambler
Notes:	compact and lightweight VHF/FM handheld transceiver, offers VOX for hands free operation and whisper mode, interoperable in FM clear-voice mode with Datron Squad Radio family



DTC's MeshUltra waveform and its SOL8SDR radios in tactical communications networks provides real time situational awareness with LPI/LPD.

US ARMY INTEGRATES DTC MESHULTRA WAVEFORM INTO TACTICAL NETWORK

DTC Communications announced in late-September that the firm has integrated its MeshUltra COFDM waveform into the US Army's tactical communications networks.

DTC told Armada that its MeshUltra Coded Orthogonal Frequency-Division Multiplexing (COFDM) waveform was designed from the outset to provide optimal performance

in heavily contested and congested electromagnetic environments. Using multiple-in multiple-out transmission techniques, by which several transmission paths are used to send traffic to reduce the disruption that physical obstacles can cause to line-of-sight communications, the MeshUltra waveform can handle 87 megabits-per-second (mbps) of data across 20 megahertz/MHz channels, or 5.6mbps across 1.25MHz channels.

SOL8SDR

The company launched the MeshUltra waveform in 2019. It is carried by the firm's SOL8SDR series of software-defined radios. These transceivers cover bandwidths of zero to six gigahertz. One important feature of the SOL8SDR family is the low transmission power of these radios of circa 200 milliwatts. This contributes greatly to their Low Probability of Detection/Interception (LPD/I) characteristics. LPD/I techniques are further enhanced by the Cognitive Radio Dynamic Spectrum Access technique that DTC include in their systems. This is a clever approach by which radios in a network will sense the level of interference or jamming affecting a network and alter their frequencies accordingly to avoid or minimise this. The company refers to this concept as "every radio a sensor". This is emblematic of the cognitive radio techniques increasingly prevalent on the battlefield. DTC describes its MeshUltra waveform as "ground-breaking" saying it has been "designed from the ground up for optimal performance in the presence of heavy multipath interference." The company continues that the waveform "employs over 800 carriers in contrast to

the 50 carriers of Wi-Fi, allowing for a lower symbol rate on each carrier and therefore much better resistance to long-range multipath reflections."

TOKENS

Another important contribution that the MeshUltra waveform makes in contrast to other MANET (Mobile Ad Hoc Networking) waveforms is that it does not employ the principle of contention. Conventional MANET radios wait for a clear channel before sending data. This causes contention when two or more radios try to transmit at the same time. This can cause latency in data transmissions when radios are waiting for a clear channel, or when they keep trying the same channels until they are clear. DTC says that this causes "multiple retries and significantly reduces real world network capacity, particularly in a large network." Instead MeshUltra uses a token-based managed channel access mechanism. This approach is analogous to a single-track railway where only a train holding a specific token can travel down the stretch of track to avoid collisions. Likewise, only a radio holding a channel access token can transmit: "This completely removes self-interference and allows networks to operate extremely efficiently, and with low and predictable latency, even at very high utilisation." Alongside this token system, the firm says that it employs the Internet Group Management Protocol multicast technique "in order to avoid the unnecessary repetition of transmission intended for multiple recipients."

TACTICAL RADIOS LISTINGS

HH3100 Spectre M multiband tactical transceiver

Datron



Power:	up to 7W in three programmable settings
Frequencies/waveforms:	30MHz to 512MHz (depending on model), 100 programmable channels
Security:	Embedded ECCM & COMSEC with Spectre 40, 64, and new AES-256, frequency hopping and digital encryption. Fully compatible with PRC2100V and HH2100V Spectre V ECCM
Weight:	1.2kg inc battery
Notes:	Spectre M family offer secure communications in ruggedised form-factors, provide a sophisticated feature-set, and utilise a simplified user interface, includes three versions: HH3100V, HH3100A, and HH3100M. Ground-to-Air AM operation in some models.

TWH-101 and TWH-104 Personal Radios

EID Tactical Radio Systems



Power:	100mW for TWH-101R
Frequencies/waveforms:	Operates in the 2.4GHz ISM band with low-probability-of-detection TDMA waveform.
Security:	AES encryption, user downloadable keys
Weight:	300g to 680g including batteries.
Notes:	Provides full-duplex audio conference, simultaneous data, dual PTT, stereo operation, VOX, whisper mode, voice prompt menus, automatic network management, embedded GPS/GLONASS.

TWH-104G1 and TWH-104G3 Portable Gateways

EID Tactical Radio Systems



Power:	400mW
Frequencies/waveforms:	AES encryption
Range:	2km line of sight
Maximum data rate:	115.2kbps
Weight:	0.225kg inc batteries: 9VDC to 33VDC in TWH-104G1, 3VDC from 2x LR6 cells or 2x NiMH LR6 rechargeable batteries.
Notes:	Creates a gateway between a TWH network and external equipment such as CNR, legacy radios etc.

Micom 3 Pathfinder manpack

Elbit Systems of America



Power:	25W
Frequencies/waveforms:	1.6MHz to 30MHz HF-SSB, 200 preset channels
Security:	Digital AES vocoder encryption, internal modem with optional AES encryption
Weight:	3.6kg without battery
Notes:	Provides long-range communications in demanding dismounted operations. Automatic Link Establishment per MIL-STD-188-141B standard.

PNR-500 Personal Network Radio

Elbit Systems



Power:	up to 800mW
Frequencies/waveforms:	380MHz to 430MHz or 400MHz to 450MHz UHF, 100kHz channel spacing, 15 presets
Security:	AES encryption
Weight:	Less than 450g including battery
Notes:	Offers SOF, snipers & CT units simultaneous voice and data communication at ranges to 1,500m, long-range links via VIC-500 vehicle intercom or tactical VHF/HF radio.

PNR-1000A Personal Network Radio

Elbit Systems



Power:	0.5W, 1W, 2W adjustable
Frequencies/waveforms:	225MHz to 512MHz,
Security:	AES 256 encryption based on FIPS 197 standards
Weight:	< 0.36kg
Notes:	E-Lynx family SDR for dismounts providing full-duplex voice, data and video, ad hoc networking for 64 members. Self-synchronises without master station or GPS, features embedded GPS position reporting.

CNR-710 Handheld

Elbit Systems



Power:	5W, 20W with amplifier
Frequencies/waveforms:	30MHz to 88MHz VHF/FM, 25kHz channel spacing, 20 presets, software controls programming, network management, data comms etc
Security:	Voice and data encryption, advanced frequency-hopping synchronisation. Digital encryption with very long non-linear "white" sequences, clear over-ride and COMSEC alarm
Notes:	Handheld member of CNR family. Features synchronous/asynchronous data transmission, error correction coding, automatic data rate adaptation. More powerful manpack, airborne & vehicle configurations available.

CNR-710MB multiband radio

Elbit Systems



Power:	5W handheld & man-pack, 20W high-power man-pack, vehicular & airborne
Frequencies/waveforms:	30MHz to 512MHz, 25kHz channel spacing, 20 preset channels
Security:	Digital COMSEC, orthogonal frequency hopping ECCM
Notes:	Multi-band radio providing ground, sea, and air units with wide frequency coverage and waveforms. Dynamic network synchronisation eliminates the need for a central control station. Uses Tadiran's synchronous-orthogonal frequency hopping technology, and is fully compatible with legacy Tadiran frequency hopping systems like the CNR-710, CNR-900, CNR-9000 and CNR-9000HDR.

MTCR-7200 V/UHF man-pack

Elbit Systems



Power:	10W
Frequencies/waveforms:	30MHz to 512MHz narrowband waveform, 225MHz to 512MHz wideband waveform, multiple waveforms covering the aforementioned NATO mobile frequency bands, 100 channels per waveform.
Security:	AES256 encryption and Elbit/Tadiran algorithm, synchronous orthogonal frequency hopping, autonomous, GPS-independent synchronisation with not master station, no single point of failure.
Weight:	<3kg manpack
Notes:	Extended networking coverage using robust and unique multi-hop concurrent flooding techniques. Provides simultaneous multiple voice sessions along with data and video services. Embedded IP router supports standard IP routing protocols. Embedded GPS supporting continuous high resolution Blue Force Tracking.

PRC-434G/CS survival radio

Elbit Systems



Power:	approx 1W UHF & 121.5MHz
Frequencies/waveforms:	225MHz to 299.975MHz + 121.5MHz, 3,000 channels in 25kHz steps
Security:	Encrypted individual identification code assigned to each user; LPI/LPD
Weight:	less than 0.85kg
Notes:	ASARS- and NATO-compatible radio featuring automatic activation, transmission of GPS location data and digital emergency messages, can be activated by another PRC-434. Endurance of 30 hours at 1:10 Tx/Rx ratio.

INTRODUCING THE

LYNQ PRO

The new **Lynq Pro** gives assured PNT even in the most remote areas.

OTTO.

ottofedmil.com

847.428.7171



Hook 3 combat survival radio

General Dynamics Mission Systems



- Power:** 1W – UHF; capable of 5W (FM), 200mW – VHF; capable of 2W (FM), 406 SARSAT 5.0W min, UHF SATCOM 5.0W ± 2dB
- Frequencies/waveforms:** 121.5MHz, 123.1MHz; 225MHz to 320MHz; capable of 100MHz to 512MHz; 406 SARSAT, Hook 2 & satcom
- Security:** Hook 2 waveform is secure, 256bit AES encryption for satcom
- Weight:** 0.680kg
- Notes:** New Hook family CSAR radio that is smaller, lighter and more power-efficient than its predecessors. Fully compatible with existing Hook 2 radios, Quickdraw2 interrogator, satcom base station.

AN/PRC-112G Transceiver

General Dynamics Mission Systems



- Power:** Selectable up to 5W
- Frequencies/waveforms:** 225MHz to 450MHz, 1250MHz to 1390MHz, 1755MHz to 1850MHz, SRW and future waveforms
- Security:** Programmable COMSEC and TRANSEC, Type 1, Type 2, not a Controlled Cryptographic Item (non-CCI)
- Weight:** 0.767kg with battery, 0.43kg without
- Notes:** Small handheld networking radio providing secret or sensitive-but-unclassified communication for leaders or squad members in a single non-CCI device, designed to operate with AN/PRC-155. Compatible with Sidewinder vehicle mount.

AN/PRC-154A Rifleman Radio

General Dynamics Mission Systems



- Power:** Selectable up to 5W
- Frequencies/waveforms:** 225MHz to 450MHz, 1250MHz to 1390MHz, 1755MHz to 1850MHz, SRW and future waveforms
- Security:** Programmable COMSEC and TRANSEC, Type 1, Type 2, not a Controlled Cryptographic Item (non-CCI)
- Weight:** 0.767kg with battery, 0.43kg without
- Notes:** Small handheld networking radio providing secret or sensitive-but-unclassified communication for leaders or squad members in a single non-CCI device, designed to operate with AN/PRC-155. Compatible with Sidewinder vehicle mount.

Pro & Pro X goTenna

goTenna



- Power:** up to 5W
- Frequencies/waveforms:** 142MHz to 175MHz VHF, 445MHz to 480 MHz UHF channel spacing 6.25kHz, 12.5kHz, 25kHz (user selectable), 4GFSK modulation
- Security:** end-to-end PKI encryption (256-bit AES)
- Weight:** 78g
- Notes:** Small, light digital mesh-networking tactical radio designed to work with an iOS and Android smartphone apps. Designed to enable 100 percent off-grid comms using Android Team Awareness Kit, also supports custom apps. Offers text messaging, GPS team tracking, collaborative mapping, point sharing of targets, friendlies, rally points, medevac locations etc, emergency beacon. Pro X radios transmit critical data up to four miles point-to-point, and securely hop messages across six devices. Both offered with multi-device deployment kits.

SR600 UHF Soldier Radio

Kongsberg Defence Systems



- Power:** 10mW to 1W
- Frequencies/waveforms:** 225MHz to 400MHz, to 5MHz bandwidth
- Security:** Embedded AES256 encryption
- Weight:** 0.7kg
- Notes:** Software-defined, IP-based SR600 connects all soldiers within a squad while offering full integration into the platoon/company network. Allows the squad leader full intra- and inter squad radio communication with a single radio. Also features high data capacity to share video over realistic combat distances.

MH300 Handheld Multi-Role Radio (MRR)

Kongsberg Defence Systems



- Power:** 15mW, 1W
- Frequencies/waveforms:** 30MHz to 87.975MHz, 2,320 channels
- Security:** Built in encryption, up to level secret, comprehensive crypto and key management provided
- Weight:** 1.055kg
- Notes:** Software configurable handheld MRR suited to CNR voice and advanced data networks. Features include tactical SMS with free-text or predefined messages (individual or group), "grab and run" from vehicle installation.

TACTICAL RADIOS LISTINGS

MP300

Kongsberg Defence Systems



- Power:** 10mW, 0.5W, 5W, 50W/ MRR special waveform
- Frequencies/waveforms:** 30MHz to 87.975MHz, 2,320 channels
- Security:** Built-in COMSEC; electronic protective measures including Narrow Band Direct Sequence Spread Spectrum (NBDS) in fixed-frequency operation, frequency hopping, multi-hop packet radio service with automatic routing, multipath integration.
- Notes:** Software upgradable man-pack for CNR and advanced data network services. Features: up to 19.2kbps data with forward error correction, voice, transparent and packet data, interference cancelling.

AN/PRC-150(C) HF Manpack Radio

L3Harris Tactical Communications



- Power:** 1W, 5W, 20W PEP, -1/+2dB (1W, 5W, 10W FM)
- Frequencies/waveforms:** 1.6MHz to 60MHz/HF features: encrypted data, ALE, frequency hopping, vocoder, data link layer protocol, VHF features: vocoder, encrypted data
- Security:** US Type-1 and coalition encryption, enhanced frequency hopping
- Weight:** 4.7kg without batteries
- Notes:** Falcon II family advanced HF-SSB/VHF-FM secure voice and data manpack radio. Provides up to 9,600bps (HF), and selectable ARQ modes reduce on-the-air transmission time and enhance secure data transmission. In addition to MIL-STD-188-141B ALE, the AN/PRC-150(C) includes STANAG 4538 third generation HF Link Automation.

AN/PRC-152A Wideband Networking Radio

L3Harris Tactical Communications



- Power:** user selectable 250mW to 5W, 10W satcom mode
- Frequencies/waveforms:** 30MHz to 520MHz and 762MHz to 870MHz. NB: AM/FM, VULOS, SINCGARS & HAVEQUICK I/II (standard), HPW, HPW IP, APCO P25 Phase 1 trunking, conventional and OTAR (optional). WB: ANW2C (standard), SRW (optional). UHF satcom: Mil-Std-188-181B dedicated channel is standard, Mil-Std-188-182A, 183A DAMA, Mil-Std-188-181C, 183B IW Phase 1, High Performance Waveform (HPW) & HPW IP, SATCOM TDMA capability waveform, all optional.
- Security:** Sierra II programmable crypto, secret or sensitive but unclassified
- Weight:** 1.2kg max with GPS, battery and antenna
- Notes:** Handheld networking SDR for simultaneous voice and data, including video.

AN/PRC-117G Wideband Multi-band Multi-mission Radio

L3Harris Tactical Communications



- Power:** NB 10W, satcom 20W; WB 20W peak, 5W average
- Frequencies/waveforms:** 30 MHz to 2GHz. NB: AM/FM, VHF/UHF LOS, SINCGARS, Havequick I/II standard, SATURN, APCO P25 & P25 OTAR optional; WB: SRW, ANW2 C, ROVER III L-Band receive (optional)
- Security:** Sierra II-based, Type 1 encryption for WB/NB NSA-certified top secret and below
- Weight:** 3.7kg without battery, 5.44kg with
- Notes:** Software defined tactical radio focused on wideband data, interoperability with fielded waveforms.

Falcon III AN/PRC-158 Multi-Channel Manpack

L3Harris Tactical Communications



- Power:** Narrowband: 10W, SATCOM: 20W; Wideband: 20W peak, 10W average (max)
- Frequencies/waveforms:** 30MHz to 2.5GHz NB: VHF 30MHz to 225MHz, UHF 225MHz to 520MHz & 762MHz to 874 MHz. NB waveforms: AM/FM, VHF/UHF LOS, SINCGARS, Havequick, (SATURN, APCO P25 capable). SATCOM: Rx 243MHz to 270MHz, Tx 292MHz to 318MHz. MUOS: Rx 360MHz to 380MHz, Tx 300MHz to 320MHz. WB: 225MHz to 520MHz UHF, 762MHz to 2.5GHz L-band. WB waveforms: SRW, ANW2C.
- Security:** Sierra II-based, Type 1 (Suite A/B) NSA certified Top Secret and below.
- Weight:** 5.76kg inc battery.
- Notes:** Multi-channel man-pack includes MUOS-ready hardware for SATCOM connectivity while on the move. NSA-certified for voice and data up to U.S. TOP SECRET with L3Harris Sierra II encryption, the man-pack is fully JTRS COMSEC and TRANSEC compliant.

RF-330-E-HH wideband networking handheld L3Harris Tactical Communications



- Power:** 3.2W max, user selectable
- Frequencies/waveforms:** UHF: 225MHz to 450MHz, 99 channel presets (L-Band: 1250MHz to 1390MHz and 1755MHz to 1850MHz, extension to 2.5GHz optional)/ ANW2C, others available.
- Security:** Type 3 AES 256 for voice, video & data.
- Weight:** 0.780kg with battery
- Notes:** Lightweight radio designed for operations in geographically challenging environments. Can serve as a 'black' relay for secure, encrypted video and data between multiple Type 1 tactical sets. Can be deployed a leave-behind device.

Connectivity Across the Battlefield

Bittium Tough SDR Handheld™
Bittium Tough SDR Vehicular™

Outstanding situational awareness and interoperability for combat vehicles and soldiers with the widest range of frequency bands and flexibility to use different waveforms, such as ESSOR.

Contact us for more information:

defence@bittium.com

www.bittium.com



Bittium

TACTICAL RADIOS LISTINGS

RF-7800H-MP wideband HF/VHF radio

L3Harris Tactical Communications



Power:	HF: 1W, 5W, 20W PEP; VHF: 1W, 5W, 10W FM
Frequencies/waveforms:	1.5MHz to 59.999MHz/ Fixed frequency, 2G ALE, 3G ALE, Serial Tone ECCM Falcon II interoperable, VHF FM, 75 channel presets
Security:	Citadel encryption, CAM (Customer Algorithm Modification), AES, AVS (Analog Voice Security)
Weight:	3.9kg without batteries
Notes:	RF-7800H-MP Falcon III man-pack provides wideband data performance and interoperability with fielded Falcon II HF radios. Synchronous and IP applications include Harris Wireless Messaging Terminal, Tactical Chat IP and hC2 Patrol.

RF-7800V-HH VHF Handheld Radio

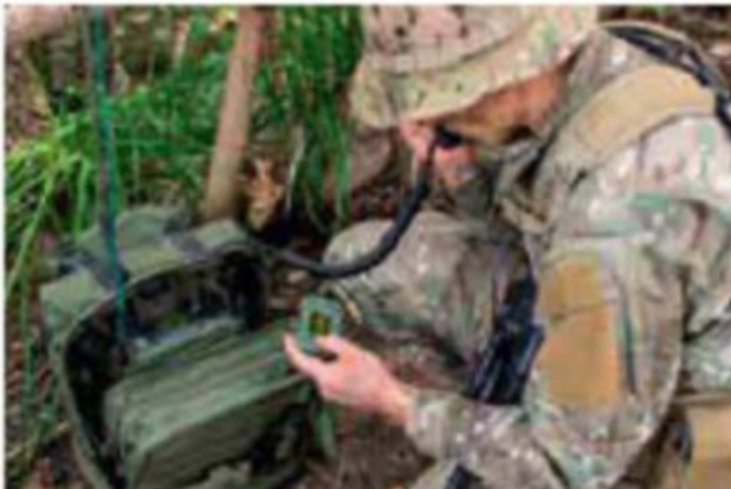
L3Harris Tactical Communications



Power:	Selectable 0.25W, 1W, 2W, 5W and up to 10W
Frequencies/waveforms:	30MHz to 108MHz/ Quicklook 1A, Quicklook 2, Quicklook 3, Free Channel Search, Quicklook Wide, TNW, Export SINCGARS with Pavillion encryption (optional)
Security:	128bit & 256bit Harris proprietary (Citadel) and AES Customer Algorithm
Weight:	1.09kg with battery
Notes:	Designed for traditional CNR missions, ground-to-air and company, and below comms, provides high-speed narrowband networking, manpack performance in a handheld, can be used with 50W amplifier for mid-tier networking.

RF-7800H-MP Wideband HF/VHF set

L3Harris Tactical Communications



Power:	HF:1W, 5W, 20W PEP, -1/+1 dB, VHF: 1W, 5W, 10W FM
Frequencies/waveforms:	1.5MHz to 59.999MHz, 75 channel presets/ Narrowband: fixed frequency, 2G ALE, 3G ALE, Serial Tone ECCM Falcon II interoperable, VHF FM; Wideband: MIL-STD-188-110C Appendix D, DTE synchronous data and IP data
Security:	Citadel, CAM (Customer Algorithm Modification), AES, AVS (Analog Voice Security)
Weight:	3.9kg without battery
Notes:	Light, compact manpack. Wideband waveform supports data rates up to 120kbps in bandwidths from 3kHz to 24kHz. Synchronous and IP applications include Harris Wireless Messaging Terminal, Tactical Chat IP and hC2 Patrol.

RF-7850S Advanced Wideband Secure Personal Radio

L3Harris Tactical Communications



Power:	3.2W
Frequencies/waveforms:	225MHz to 2500MHz/ NB: TDMA Networking Waveform with optimised voice and guaranteed GPS reporting, frequency hopping, VHF-UHF Line-Of-Sight interoperable with Harris radios; WB: Soldier-TDMA Networking Waveform serves team, squad, platoon deployments, simultaneous voice & data
Security:	256bit Citadel, 256bit AES
Weight:	0.775kg with standard battery
Notes:	RF-7850S enables networked platoon-wide full duplex audio, multiple, concurrent talk-groups, simultaneous voice, position reporting and IP data up to 1.5Mbps, ad hoc mesh networking.

RF-7850M-HH Multiband Networking Handheld

L3Harris Tactical Communications



Power:	Selectable 0.25W, 1W, 2W, 5W and up to 10W
Frequencies/waveforms:	Narrowband: 30MHz to 512 MHz, Wideband: 225MHz to 512 MHz, AM: 108MHz to 512MHz/ NB: TDMA Networking Waveform (TNW) 25K and 75K; WB: M-TNW, ANW2 C (optional)
Security:	Quicklook 1A, 2, 3 and Quicklook-Wide ECCM, 1128bit & 256bit Harris proprietary Citadel AES 128 & 256, Customer Algorithm Modification encryption
Weight:	less than 1kg with battery
Notes:	Intended for traditional CNR missions, ground-to-air and company and below voice and data comms. Optional 50W amplifier enables use in mid-tier tactical networks. Provides manpack performance in a handheld, interoperable with Falcon II and III sets.

RO Tactical Radio

L3Harris Tactical Communications



Frequencies/waveforms:	Defence Information Systems Agency Enhanced Mobile Satellite Services.
Security:	NIST certified AES 256 voice and data encryption (can be used by coalition troops).
Weight:	0.510kg without antenna.
Notes:	Using Distributed Tactical Communications System satcom service, operator can reach thousands of other RO tactical radios within a 100-250 mile range anywhere with sight of sky. Described as a global push-to-talk satcom tactical handheld radio.

SINCGARS RT-1523 VHF Radio
L3Harris Tactical Communications


Power: 1mW, 100mW, 5W, 50W (with power amplifier)
Frequencies/waveforms: 30MHz to 87.975MHz/ SINCGARS
Security: internal Encryption Module, CT/PT, frequency hopping
Weight: 3.5kg with battery
Notes: Offered in vehicle and man-pack configurations. In the mobile role, the radio works with an embedded tactical data router, and as a man-pack it features a standard point-to-point-protocol interface. Both allow a C2 application to access the tactical internet.

SINCGARS RT-1702 VHF Combat Net Radio
L3Harris Tactical Communications


Power: 1mW (LO), 100mW (MED), 5W (HI), 50W (PA with RFPA power amplifier)
Frequencies/waveforms: NB: STANAG 4204 compliant (SC); WB: SINCGARS (FH)
Security: Country unique Pavilion SINCGARS
Weight: 3.5kg including BB-2590 battery
Notes: Man-pack or vehicle-mount radio that provides situational awareness through real-time maps, location and IP data with an optional, embedded 12-channel GPS.

Tactical Network Rover (TNR)
L3 Harris Communications Systems West


Notes: Handheld transceiver that provides a multi-megabit, bidirectional data link capability to dismounted combat troops. Combines video downlink receiver functionality with broadband IP networking capability. TNR uses the existing ROVER communications infrastructure for air-to-ground interoperability and ground-to-air networking within a Net-T network, supporting digitally aided close air support, ground force position sharing, chat and large file transfers.

Tactical Network Rover e (TNRe) video receiver
L3 Harris Communications Systems West


Frequencies/waveforms: Supports UHF, L-, S-, C- and Ku-Band operations/ capabilities include DDL, DVB-T, Tactical, BE-CDL, CDL, Legacy digital, 466ER, VNW and FM analog
Security: NSA-approved Type 1 and AES encryption
Notes: Small-form-factor hand-held radio provides full bidirectional connectivity to vehicles or the dismounted user. Receives full-motion video and sensor data, enables secure digital video, chat, VoIP and other network-enabled applications. Fully interoperable with ROVER. Antenna can be connected directly to radio or remotely through cables.

Tactical Rover e (TACe) video receiver
L3 Harris Communications Systems West


Notes: Pocket-sized receiver that provides encrypted digital and analog video with aircraft and sensor positional data directly to the dismounted user for real-time situational awareness. Interoperable with fielded ISR and fighter aircraft video transmitters. Receives and displays video, aircraft position and sensor point of interest simultaneously. Features automatic waveform search, speed dial preset recall allows quick switching between multiple video feeds.

Tactical Rover p (TACp)
L3 Harris Communications Systems West


Frequencies/waveforms: L, S, C & Ku bands/ DDL, DVB-T, Tactical, CDL, legacy digital (455), 466ER, VNW, FM analogue. Handles H.261, H.264, MPEG-2, MPEG-4, MJPEG, analog NTSC/PAL video feeds.
Security: AES & triple DES supported.
Weight: 0.5kg
Notes: Small, light, IP-based, multiband, secure, digital and analog receiver designed for ease of integration. Interfaces allow connection with 'virtually any' warfighter system, existing display device, computer and power source.

DTC DELIVERS UNSURPASSED SUBTERRANEAN COMMUNICATIONS



Herndon, VA: DTC Communications Inc. (DTC) delivers MANET Mesh radios for a successful End-User trial in a subterranean/ underground and Non-Line-of-Sight environment. DTC radios live streamed 6 dismounted Video and Voice feeds from the P4 Basement of a shopping mall to L2, some 6 floors above, and to a Command Post 400m outside. Juan A. Navarro, CEO, DTC, says "This was truly great work by our "Make-in-India" partners Brij Systems Limited and Exicom Technologies India LLP."

DTC's technology delivers Mission Critical, Secure, Tactical Data, Video and Voice providing real-time Situational Awareness for Assault Teams and Special Operations. The OEM solution was designed and engineered specifically for Exicom Technologies in DTC UK.

Mr. Sandeep Agarwal Chairman of Exicom Technologies LLP of Mumbai said "over the past 2 years we have benchmarked many suppliers of Manet Mesh Radios and have not found one, other than DTC, that could perform in such challenging environments while delivering high quality video, data and voice with extremely low latency."

The MeshUltra COFDM waveform is MiMo-capable and extremely spectrally efficient. DTC can offer up to 87Mbps in 20MHz channels and up to 5.6 Mbps in a narrow 1.25MHz channel – over ten times the throughput of some industry solutions in "like for like" bandwidths.

Elaine Wilde
Vice President, Global Marketing & Channels
T: +1 (727) 471-6921
Email: Elaine.Wilde@domotactical.com

DTC

DTC Communications, Inc., 2303 Dulles Station Blvd., STE 205, Herndon, VA, 20171, USA.

+1 (727) 471-6900
www.domotactical.com

Personal Role Radio (PRR)

Leonardo



- Power:** 50mW
- Frequencies/waveforms:** 2.4GHz direct sequence spread spectrum modulation
- Security:** Encryption optional
- Notes:** Compact and lightweight PRR with a typical operating range of 500m in open terrain, and through three floors of a building, features wireless press to talk with up to 2m range, operates independently of any infrastructure, interfaces with combat net radios.

Enhanced Personal Role Radio (EZPRR)

Leonardo



- Power:** 100mW
- Frequencies/waveforms:** 2.4GHz direct sequence spread spectrum modulation
- Security:** Encrypted
- Notes:** Typical operating range is 800m in open terrain, and through three floors of a building; wireless Press To Talk (PTT) with 2m range; features interchangeable switch pack, tailorable audio ancillaries; independent of infrastructure. Enhancements include extended range, more capable antenna, gooseneck antenna, data capabilities, rebroadcast, C2 base station, special purpose ancillaries.

SWave Enhanced Handheld (HH-E)

Leonardo



- Power:** 5W (50W in vehicles)
- Frequencies/waveforms:** 30MHz to 512MHz V-UHF/ NB VuLOS V/U AM/FM (STANAG 4204/4205), IP MIL-STD-188-220C (datalink), SelfNET EASY II (EPM/ECCM), SelfNET Networking Soldier Broad band Waveform (WB MANET), SelfNET Narrowband Adaptive Waveform (NB MANET)
- Security:** Embedded programmable COMSEC up to national restricted and TRANSEC, embedded AES 256 crypto engine, support for custom crypto algorithms.
- Weight:** 0.63kg with standard battery
- Notes:** Handheld or body-worn radio for soldier and commander use at platoon or section level, offering simultaneous voice and data communications at the tactical edge, configurable for vehicle use.

Swave MB1 manpack/vehicle radio

Leonardo



- Power:** Up to 20W, or 50W with vehicle amplifier
- Frequencies/waveforms:** VuLOS V/UHF AM/FM (NB), MIL-STD-188-220C (data link IP), SINCGARS, HQ I/II, SelfNET EASY II (EPM), DAMA (MIL-STD-181A, MIL-STD-182A, MIL-STD-183, MIL-STD-184 (TACSAT), SelfNET Networking Soldier Broadband Waveform (WB MANET), SelfNET Narrow Band Adaptive WF (NB MANET)
- Security:** Embedded customisable COMSEC, TRANSEC
- Weight:** under 8kg inc battery
- Notes:** Family of reconfigurable man-pack radios for dismounted and vehicular use, supporting wide-band IP voice and data, secure CNR voice and video.

DICOM RF13 Portable VHF Transceiver

MESIT Defence



- Power:** 0.2W, 5W
- Frequencies/waveforms:** 30MHz to 88MHz, 2,320 channels with 25kHz spacing, nine presets
- Security:** internal digital voice encryption
- Weight:** Transceiver weighs 2.5kg without batteries or accessories, < 10.9kg for complete set in carrying bag with spare battery
- Notes:** Integrated VHF communications system based on RF13 portable radio transceiver has been developed, provides selective calling for up to 99 users

DICOM RF23 EPM Multiband Handheld Transceiver

MESIT Defence



- Power:** 2W nominal, 0.2W reduced, 5W increased (FM), 1W nominal, 0.1W reduced (AM)
- Frequencies/waveforms:** 25MHz to 146MHz / LOS FM/AM (STANAG 4204/4205), HW20 (VHF EPM waveform)
- Security:** TRANSEC - frequency hopping technology. COMSEC - communications secured using AES based encryption, emergency erasing of operational data
- Weight:** 0.85kg (transceiver), 0.3kg or 0.45kg (battery pack)
- Notes:** Voice and data transceiver for tactical command; features enhanced resistance to EW. Uses TNC connector to expand range of antennas; features inbuilt GPS receiver with location information distributed with voice or data as a part of the waveform.

DICOM RF2305 Manpack

MESIT Defence



Power:	5W FM, 1W AM
Frequencies/waveforms:	25MHz to 146MHz / LOS FM/AM (STANAG 4204/4205), HW20 (VHF EPM waveform)
Security:	TRANSEC - frequency hopping technology. COMSEC - communications secured using AES based encryption, emergency erasing of operational data
Weight:	4kg
Notes:	Tactical command radio based on RF23, range increased to 15km with improved antenna & counterweight, maintains complete RF23 functionality

DICOM RF40 Handheld

MESIT Defence



Power:	5W normal 10W burst
Frequencies/waveforms:	30MHz to 512MHz, LOS FM/AM (STANAG 4204/4205), WF40 (VHF/UHF MANET waveform), HW20 (VHF EPM waveform).
Security:	AES-based encryption, up to 384bit key length
Weight:	0.9kg inc. battery pack
Notes:	Back compatible with system RF20, multi-channel radio with simultaneous voice & data capability, integral GNSS receiver for GPS, GLONASS & Galileo systems, will accept further legacy and custom waveforms

SRX 2200 Enhanced single band portable

Motorola Solutions



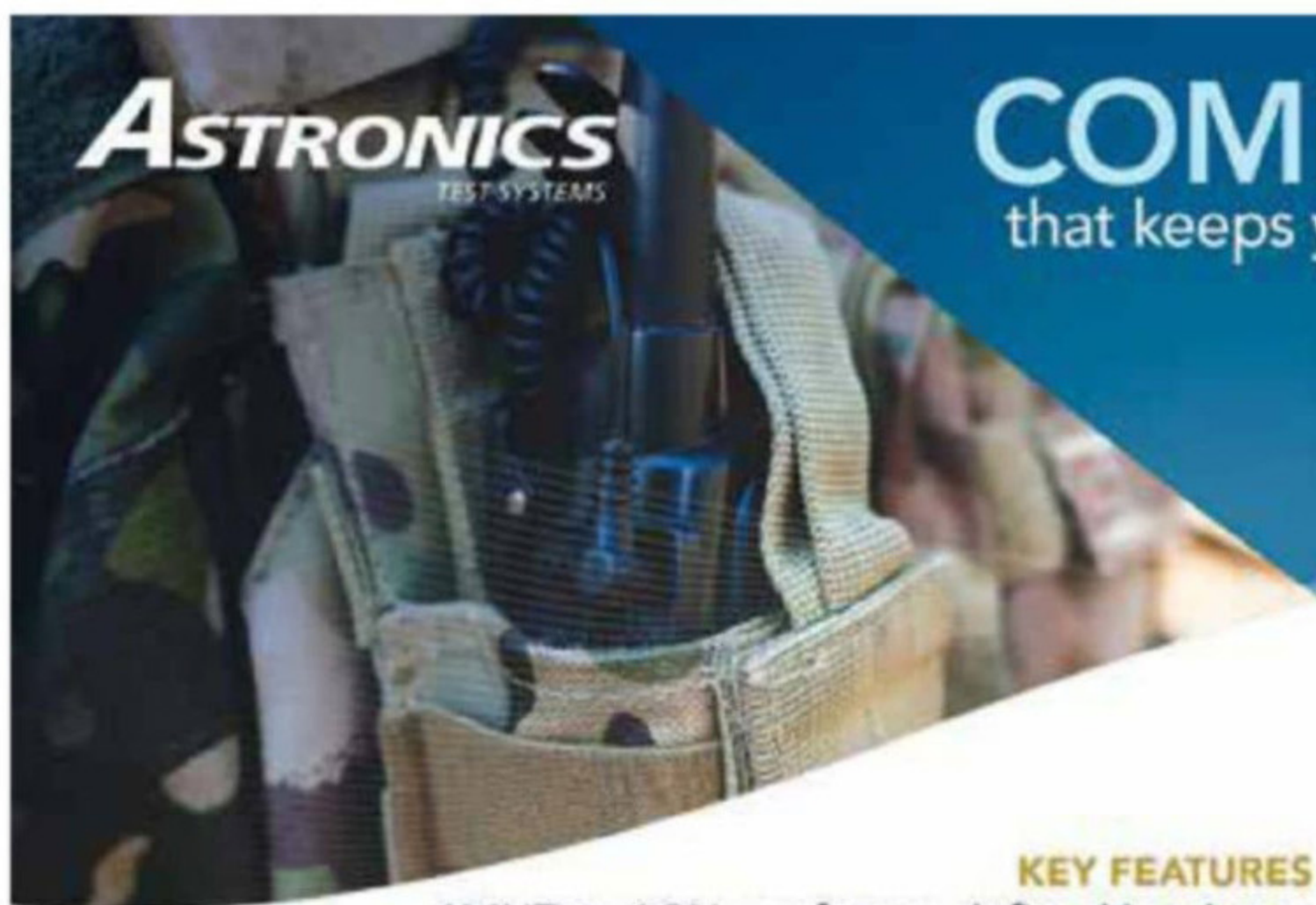
Power:	1W to 3W @ 700MHz to 800MHz, 1-6W VHF, 1-5W UHF range 1
Frequencies/waveforms:	136MHz to 174MHz VHF, 380MHz to 470MHz UHF range 1, 700MHz to 800 MHz
Security:	Supports ADP, AES, DES, DES-XL, DES-OFB, DVP-XL encryption algorithms, and WPA-2, WPA, WEP WiFi security protocols
Weight:	309g without battery
Notes:	SRX 2200 P25 two-way portable radio is evolving to support new technologies like WiFi, Adaptive Audio Engine, and Bluetooth 4.0 wireless technology. Ultra-low power operation allows military personnel to communicate in 0.25-watt transmission for low detection (UHF range 1 only).

COMP@N H07 VHF/UHF handheld

Radmor



Power:	Max 5W (FM, programmable), max 6W (PEP)
Frequencies/waveforms:	20MHz to 520MHz and 30MHz to 137MHz/ DV Reutech narrowband waveform providing secure voice transmission, 25kHz channels, digital voice transmission, 100 hops per second in frequency hopping mode, fixed frequency. Analog voice transmission at a fixed frequency in FM and AM, Radmor Serial Data (RSD) data transmission.
Security:	TRANSEC & COMSEC cryptographic protection, AES-256 voice protection
Weight:	< 1kg
Notes:	Handheld SDR radio, developed using a common hardware platform for all COMP@N family radios, on which there are a number of waveforms implemented. H07 is designed for voice communication, including: tactical short-range VHF and UHF communication for land forces; tactical short-range communication VHF for air force; communication with civilian services.



ASTRONICS
TEST SYSTEMS

COMMONALITY

that keeps you calm and connected

Portable and benchtop radio test sets providing legacy, current SDR, and future exotic waveform support for ground and airborne tactical radios.

KEY FEATURES

1MHZ to 6GHz, software-defined hardware,
16+ discrete instruments with scripted
automated testing per OEM's IMM

SUPPORT FOR

SINGARS, PRC-150/152/117G, MBITR, CUB, Shadow, and ARC-231/210/201 radios

HAVE QUICK, TRM/TSM-X, SINGARS, MUOS, SWR, and SATURN waveforms



CTS-6010



ATS-3100 RTS

LEARN MORE AT [ASTRONICS.COM/MILITARY-RADIO-TEST](https://astronics.com/military-radio-test)

COMP@N H08

Radmor



Power:	Programmable FM max 5W, programmable AM max 4 W-PEP, CPM (W2FH): 0.1W, 1W, 5W
Frequencies/waveforms:	20MHz to 520 MHz and 30MHz to 13MHz7W2FH (Waveform with Frequency Hopping) – narrowband EPM (Electronic Protective Measures) waveform that can operate in the frequency hopping mode or at fixed frequency, STANAG 4204 - fixed frequency VHF FM, STANAG 4205 - fixed frequency UHF FM/AM
Security:	TRANSEC & COMSEC cryptographic protection
Weight:	< 1kg
Notes:	Handheld SDR developed using a common hardware platform for all COMP@N family radios. W2FH waveform allows simultaneous transmission of voice and data, while the synchronization mechanism does not require GNSS.

COMP@N H09

Radmor



Power:	Programmable FM, max 5W, programmable AM, max 4 W-PEP, CPM (BMS IP WF): 0.1W, 1W, 5W
Frequencies/waveforms:	20MHz to 520 MHz / 30MHz to 137MHz/ BMS IP WF – narrowband MANET waveform that can operate in frequency hopping mode or at fixed frequency, STANAG 4204 – working at a fixed frequency VHF FM, STANAG 4205 – working at a fixed frequency UHF FM/AM.
Security:	TRANSEC & COMSEC cryptographic protection
Weight:	< 1kg
Notes:	Handheld SDR developed using a common hardware platform for all COMP@N family radios. Has implemented several waveforms, which allow a smooth transition from classical systems to modern BMS. BMS IP WF allows integration with IP networks, simultaneous voice and data transmission.

BNET-HH

Rafael Advanced Defense Systems



Power:	5W
Frequencies/waveforms:	Narrowband waveform 30MHz-88MHz, 225-512MHz (108MHz-174MHz) optional. Wideband waveform 225MHz-512MHz (L-band/S-band optional). Can support additional waveforms.
Security:	Networking ECCM capabilities, frequency hopping spread spectrum techniques.
Weight:	1.2kg
Notes:	The airborne variant of BNET, known as BNET-AR has been acquired by the Brazilian, Colombian, Germany and Indian air forces. Sales of the radio series to land forces remain unknown.

BNET-MPS/V

Rafael Advanced Defense Systems



Power:	5W/20W (BNET-MPS), 50W per channel (BNET-V)
Frequencies/waveforms:	Narrowband waveform 30MHz-88MHz, 225-512MHz (108MHz-174MHz) optional. Wideband waveform 225MHz-512MHz (L-band/S-band optional). Can support additional waveforms.
Security:	Networking ECCM capabilities, frequency hopping spread spectrum techniques.
Weight:	6kg (BNET-MPS), 13kg (BNET-V)
Notes:	The BNET-MPS is the manpack member of the overall BNET family with the BNET-V being its vehicular counterpart.

Microlight DH500

Raytheon



Power:	0.1W to 4W
Frequencies/waveforms:	225MHz to 2GHz/ Eight-hop relay, CPSM with DSSS, TDMA, CDMA and FDMA
Security:	supports commercial Advanced Encryption Standard (AES) for Secure But Unclassified (SBU) transmission
Weight:	0.76kg
Notes:	Provides simultaneous voice, data and video, automatic position location reporting, giving commanders the ability to see the location of all people and assets at all times, even in GPS-denied environments.

EPLRS-XF-I

Raytheon



Power:	50W max
Frequencies/waveforms:	225MHz to 450MHz/ enhanced positioning, TCP/IP MANET
Security:	AES encryption
Weight:	8kg
Notes:	Man-pack vehicle and airborne EPLRS radio providing robust, on-the-move, high-speed, automated data exchange using a contention-free networking architecture.

EPLRS-XF-I (lightweight)

Raytheon



- Power:** 10W to 20W
Frequencies/waveforms: 30MHz to 512MHz, 142 channel pre-sets/ SINCGARS, SATCOM, DAMA, HAVEQUICK I/II, AM, FM, FSK, B/SB/DESB/SQ PSK
Security: embedded encryption engine, embedded COMSEC for voice and data
Weight: 5.2kg
Notes: Provides lightweight, secure, network-capable, multi-band/multi-mission, anti-jam, voice/ imagery/ data communications capability in a single package.

MTR3005 Manpack

Reutech



- Power:** 10W max
Frequencies/waveforms: 118MHz to 400MHz V/UHF
Security: User definable tamper proof QCM-R module for full INFOSEC and TRANSEC autonomy, LPI via DSSS
Notes: LANDSEC HMI features integrated texting from front panel. Has CNIS Link-ZA compliant tactical data link, Bluetooth for peripherals, automatic GPS position reporting, local/networked remote control, Li-ion battery with gauge.

MTR2005 Manpack

Reutech



- Power:** 10W max
Frequencies/waveforms: 30MHz to 88MHz
Security: User definable tamper proof QCM-R module for full INFOSEC and TRANSEC autonomy.
Notes: LANDSEC HMI features integrated texting from front panel. Has CNIS Link-ZA compliant data link, Bluetooth for peripherals, auto GPS position reporting, local/networked RC, built-in antenna tuning, Li-ion battery with gauge.

MTR1025 Manpack

Reutech



- Power:** 30W
Frequencies/waveforms: 1.6MHz to 30MHz, HF
Security: User definable tamper proof INFOSEC, TRANSEC module
Notes: Features integrated texting from front panel, CNIS Link-ZA compliant data link, Bluetooth for peripherals, auto GPS position reporting, ALE to MIL-STD-188-141A, APP A, data to MIL-STD-188-110A and STANAG 4285 local/networked RC, built-in antenna tuning, Li-ion battery with gauge.

PWH4001

Reutech



- Security:** Anti-jamming, LPD waveform
Notes: LANDSEC family personal role networked radio for short-range intra-team communications with integral GPS position reporting. Provides multiple talker capability with PTT priority override and access to two external CNRs. Offers simultaneous voice, data and image transfer, built-in rebroadcast and gateway functions. PTT keys access four independent networks. Hot-swappable battery lasts up to 18 hours.

TR620

Reutech



- Power:** 5W
Frequencies/waveforms: 30MHz to 88MHz FM ground-to-ground and 118MHz to 137MHz AM ground-to-air communications.
Security: Analogue voice scrambling compatible with the TR610 and TR6000 in FM mode; provides AES 256 encryption for secure FH voice.
Notes: Handheld transceiver based on flexible DSP/SDR technology that allows configuration flexibility and an upgrade path; qualified to MIL-STD-810F.

TACTICAL RADIOS LISTINGS

TR2000 Manpack/Vehicle set

Reutech



- Power:** 25W on internal battery or 100W on 26V vehicle battery
Frequencies/waveforms: HF with Automatic Link Establishment waveform.
Security: ECCM for voice and data
Notes: Part of tactical HF product range for modern battlefield; offers ALE to MIL-STD-188-110A, built-in GPS, Bluetooth connectivity for peripherals. Micro DSP technology allows configuration flexibility and provides upgrade path.

TR2400 Manpack/Vehicle set

Reutech



- Power:** 25W on internal battery or 100W on 26V vehicle battery
Frequencies/waveforms: HF
Security: ECCM for voice and data, user-defined digital encryption
Notes: Configurable as man-pack, vehicle and fixed-installation HF radio. External co-location filter enables multi-transceiver operation. Features ALE to MIL-STD-188-141A, embedded STANAG 5066 data link protocol. Environmental & EM compliance to MIL-STD-810E and MIL-STD-461C.

TR6000 Manpack/Vehicle set

Reutech



- Power:** 10W on man-portable battery, 40W on 27V vehicle battery typical
Frequencies/waveforms: Low band VHF ground-to-ground, ATC band ground-to-air
Notes: Can be used as vehicle transceiver without need for external power amplifier. Features wireless peripheral connectivity via Bluetooth, GPS position reporting via internet. Micro DSP technology allows configuration flexibility, upgrade path.

MR300xH/U multiband HF/VHF/UHF tactical radio

Rohde & Schwarz



- Power:** Several output power classes up to 50W (VHF/UHF) and 500W (HF) with external amplifiers
Frequencies/waveforms: Multiband capability (1.5-512MHz with external devices). R&S MR300xH for HF/VHF (1.5MHz to 146MHz). R&S MR300xU for VHF/UHF (25MHz to 512MHz). Multi-Waveform capability (HF House, VHF/UHF tactical and G-A-G waveforms)
Security: Embedded EPM (ECCM) in line with R&S SECOM and R&S SECOS, HAVE QUICK II. Secure digital voice and data (AES 256)
Notes: A member of the SOVERON software defined radio family available in man-pack and vehicular configurations. Integrated GPS enables position reporting. Front panel is removable for flexible use and integrations. Features IP over-the-air capability (R&S IPoA) and SIP based remote voice operation.

HR5000 handheld tactical radio

Rohde & Schwarz



- Power:** Transmit output power: up to 5W
Frequencies/waveforms: Frequency range: 30MHz to 512MHz without gaps. A3E/F3E; SOVERON WAVE AJ-NB-S (German origin, encryption using 256bit AES (COMSEC); high data rate for two parallel voice channels with IP-based data transmission; anti-jam frequency hopping [TRANSEC]; optimised for use by dismounted soldiers in rocky and urban terrain [multipath robustness]; MANET for increased range and interoperability)
Security: Frequency hopping (TRANSEC), AES encryption (COMSEC)
Notes: A member of the SOVERON HR family, the HR5000 provides two parallel voice channels and IP-based data transmission

MR3000P handheld VHF transceiver

Rohde & Schwarz



- Power:** 5W RF output power
Frequencies/waveforms: Multiband capability (25MHz to 146MHz)
Security: Embedded EPM (ECCM) in line with R&S®SECOM-P
Notes: A member of the SOVERON software defined radio family, the MR3000P provides secure transmission of voice, data and short messages, selective calling with sender authentication, GPS position reporting.

CHEETAH3 Combat Net Multiband (HF/UHF/VHF) Manpack
Sat-Com - Secure and Tactical Communications


TX Power:
Frequencies/waveforms:

Security:

Enhanced Features:

Weight:
Notes:

VHF FM 15W/10W (HF SSB 20W), AM 7W
Frequency Range: 30 - 170 Mhz / 512 Mhz
Extended Range: 1.6-30Mhz Capable
Modulation FM, USB/LSB, AM, FSK, MSK
Advanced Modem: BPSK, QPSK, PSK, QAM, DSSS*
COMSEC: Encrypted AES256 Digital Voice
TRANSEC: OTP / AES128, 1-600 hops per second.
NETS: 8-digit decimal Mission Key.
LINKING: Ad hoc channel scan / ALE
TacTalk - Messaging, Chat, E-mail, File Transfer.
TacTalk-plus - Messaging, Chat, E-mail, File Transfer plus Frontline Battlefield awareness
1.98 kg (excluding Battery)
COMSEC (SDV) and TRANSEC(FFH) Modes on Scanning or ALE .
All VHF/UHF Features are interoperable with the LEOPARD1 and BADGER Radios.

LEOPARD1 Combat Net Multiband (HF/UHF/VHF)
Sat-Com - Secure and Tactical Communications


Power:
Frequencies/waveforms:

Security:

Enhanced Features:

Weight:
Notes:

HF SSB 20W / VHF FM 18W/10W AM 7W
Frequency Range: 1.6 - 170 Mhz / 512 Mhz
Extended Range: 1.6-30Mhz Capable
Modulation: FM, USB/LSB, AM, FSK, MSK
Advanced Modem: BPSK, QPSK, PSK, QAM, DSSS*
COMSEC: Encrypted AES256 Digital Voice
TRANSEC: OTP / AES128, 1-600 hops per second.
NETS: 8-digit decimal Mission Key.
LINKING: Ad hoc channel scan / ALE
TacTalk - Messaging, Chat, E-mail, File Transfer.
TacTalk-plus - Messaging, Chat, E-mail, File Transfer plus Frontline Battlefield awareness
3.2 kg (excluding Battery)
COMSEC (SDV) and TRANSEC(FFH) Modes on Scanning or ALE .
All VHF/UHF Features are interoperable with the Cheetah3 and Badger Radios.

BADGER 19" Multiband SDR (New Product)
Sat-Com - Secure and Tactical Communications


Power:
Frequencies/waveforms:

Security:

Weight:
Notes:

HF SSB 125W / VHF FM 200W UHF 100W AM 50W
Frequency Range: 1.6 - 170 Mhz / 512 Mhz
Modulation: FM, USB/LSB, AM, FSK, MSK
Advanced Modem: BPSK, QPSK, PSK, QAM, DSSS*
COMSEC: Encrypted AES256 Digital Voice
TRANSEC: OTP / AES128, 1-600 hops per second.
NETS: 8-digit decimal Mission Key.
LINKING: Ad hoc channel scan / ALE
TacTalk - Messaging, Chat, E-mail, File Transfer.
TacTalk-plus - Messaging, Chat, E-mail, File Transfer plus Frontline Battlefield awareness
8 kg
COMSEC (SDV) and TRANSEC(FFH) Modes on Scanning or ALE . All VHF/UHF Features are interoperable with the LEOPARD1 and Cheetah3 Radios.

Afracal2 Linear Dual POWER AMPLIFIER 125W/50W (HF/UHF/VHF)
Sat-Com - Secure and Tactical Communications


Power:
Frequencies/waveforms:
Security:
Enhanced Features:

Mounting:
Weight:
Notes:

Automatic Antenna Tuner:

HF SSB 125W / VHF 100W / UHF 75W
Exact Same as Exciter - Leopard1 Manpack.
Exact Same as Exciter - Leopard1 Manpack.
Exact Same as Exciter - Leopard1 Manpack.
Purpose Rack or desk Top
11 kg (typical)
DUAL Power Amplifier for single or dual radio deployment. RF Output/s of Radio/s are automatically switched through to the correct band antenna by the internal antenna switch based on a priority selection with two radios connected.
Radio control is passed through to ATU is connected on the rear for control.

Afracal-1000 HF High POWER AMPLIFIER
Sat-Com - Secure and Tactical Communications


Power:
Frequencies/waveforms:
Security:
Enhanced Features:

Mounting:
Weight:
Notes:

1000W Linear PEP (Liquid Cooled)
Exact Same as Exciter - Leopard1 Manpack/19" Badger
Exact Same as Exciter - Leopard1 Manpack/19" Badger
Exact Same as Exciter - Leopard1 Manpack/19" Badger
19" Rack or desk Top
25 kg (typical)
High Power Amplifier for single radio deployment if used with 19" Exciter delivering 1kW onto a Wide Band Dipole or Vertical Whip. The VHF/UHF outputs are connected to the appropriate antennas.

Streamcaster 4200E
Silvus Technologies


Power:
Frequencies/waveforms:

Security:

Weight:
Notes:

1mW to 4W variable, up to 8W effective with Tx beamforming
400MHz to 6GHz including UHF-1, UHF-2, 900 MHz ISM, Lower, Extended, Middle and upper L-bands, Broadcast B, Federal S, S-band, 2.4 GHz ISM, Low and Federal and High C-bands, 5.2GHz and 5.8GHz ISM bands /Mobile Networked MIMO (MN-MIMO) using techniques including spatial multiplexing, space-time coding, Tx/Rx eigen beamforming.
DES56 (Standard) AES256 (Optional) FIPS1 40-2 Level2 (Suite B) encryption, MANET Interference Avoidance (MAN-IA)
0.116kg
2x2 hand handheld or embedded MIMO radio. Enhancements include user-customisable multiposition switch for loading presets and zeroizing crypto, improved connectors and tie-down points for weather caps, RoIP tethering and dual PTT, IP68 enclosure (submersible to 20 meters), Smart battery percent monitoring (for SC4200E).

AN/PRC-148 MBITR/JEM

Thales



Power:	0.1, 0.5, 1.0, 3.0 and 5.0W user selectable (waveform dependent)
Frequencies/waveforms:	30MHz to 512MHz contiguous . Implemented and planned waveforms and modes include: AM/FM, Havequick I/II, MIL-STD-188-241-1/-2 (SINGARS), MIL-STD-188-181B (56kbps), MIL-STD-188-181C, -182B, -183B (SATCOM IW), ANDVT, Project 25, Over The Air Cloning (OTAC), retransmission
Security:	Programmable encryption engine supports NSA crypto modernisation requirements, certified by NSA.
Weight:	0.867kg with battery
Notes:	An evolution of the combat- proven AN/PRC-148 MBITR, the JEM is a JTRS-approved production radio, is part of a complete communications system for mounted and dismounted operations.

AN/PRC-148B MBITR2

Thales



Power:	5 W in all frequencies
Frequencies/waveforms:	30MHz to 512MHz , Soldier Radio Waveform (SRW) , MIL-STD-188-241-1/-2 (SINGARS - Standard/ FH2 EOM), MIL-STD-188-181C, -182B, -183B (SATCOM IW) , HAVEQUICK I and II, ANDVT (LPC-10, MELP), AM/FM, Project 25.
Security:	Programmable encryption engine supports NSA crypto modernisation requirements, certified by NSA.
Weight:	1.225kg
Notes:	Combines AN/PRC-148 and AN/PRC-154 wideband tactical handheld radio capabilities to integrate dismounts into the wideband tactical IP and voice network via the SRW, simultaneously connecting with older nets via narrowband.

AN/PRC-6809 Multi-Band Inter/intra Team Radio

Thales



Power:	0.1W to 5.0W
Frequencies/waveforms:	30MHz to 512 MHz contiguous , Havequick II frequency hopping ECCM waveform, country-specific ECCM waveforms
Security:	Type 3 DES (optional), 256-bit AES (optional)
Weight:	0.867kg
Notes:	Non-Type 1 version (without NSA approved cryptographic algorithms) of the AN/PRC-148 compatible with all MBITR family products and available to US, allied and coalition forces.

AN/PRC-154A Rifleman Radio

Thales



Power:	User selectable up to 5W
Frequencies/waveforms:	225MHz to 450 MHz (UHF band), 1,250MHz to 1,390MHz and 1,750MHz to 1,850MHz (L-band); supports SRW
Security:	Programmable COMSEC and TRANSEC NSA certified for Type 1 secret and below, non-CCI.
Weight:	0.771kg with battery
Notes:	Low-cost, body-worn radio that transmits voice and data simultaneously using the SRW, bringing secure secret and below squad-level communications to the soldier at the tactical edge, enables situational awareness and blue force tracking.

AN/PRC-154B Rifleman Radio

Thales



Power:	user selectable up to 5W
Frequencies/waveforms:	UHF band 225MHz to 450MHz, L-Band 1250MHz to 1390 MHz, 1750MHz to 1850 MHz/ Soldier Radio Waveform (SRW)
Security:	embedded encryption, COMSEC, TRANSEC
Weight:	0.771kg with battery
Notes:	Increased RF range, battery life, and added visual HMI display built on the successful and field proven AN/PRC-154A Program of Record Rifleman Radio

BCC 67 Panther VHF Manpack Radio

Thales



Power:	selectable up to 5W or 20W boosted mode in vehicle configuration
Frequencies/waveforms:	30MHz to 108MHz
Security:	Secured voice and data 16kbps digital encryption, high EPM protection including frequency hopping, free channel search and mixed mode
Weight:	5.9kg with battery
Notes:	Interoperable with Jaguar radios. Battery life: 32 hours with rechargeable Li-Ion battery pack. Advanced CNR services including group selective call, alert, authentication, passive late entry, over-the-air rekeying

St@r Mille Handheld

Thales



Power:	2 W
Frequencies/waveforms:	UHF 310MHz to 470MHz, supports squad, platoon and weapon system waveforms
Security:	Embedded AES-256 encryption
Weight:	0.38kg without battery
Notes:	Light and compact, the software-defined ST@R Mille enables simultaneous voice and data communications featuring automatic position reporting. Features standard V24, USB and Ethernet interfaces. Range greater than 1.5km in open terrain

SYNAPS-H

Thales



Frequencies/waveforms:	VHF & UHF/ Waveform library provides NATO, coalition & advanced networking waveforms. Manoeuvre waveforms provide collaborative combat capabilities over wideband networks
Notes:	Handheld terminal of new SYNAPS networking SDR family designed to provide an easy and adaptable radio solution for network centric transformation of all forces. RF module performance extends communication range.

TC9210 PR4G VHF Manpack Radio

Thales



Power:	selectable up to 10W
Frequencies/waveforms:	30MHz to 88MHz/ CNR mode (voice or data), iMux mode (simultaneous voice and data), SuperMux mode (data at 21.6 kbps), GeoMux mode: voice + data + BFT, SuperMux HD (60 kbps), Single Radio Relay (3 bounces voice or data), FireMux mode (Weapon System Triggering)
Security:	High grade built-in encryption and advanced protection schemes including Fast Frequency Hopping (FFH), Free Channel Search (FCS) and mixed FH and FCS modes
Weight:	3.4kg without battery
Notes:	An advanced combat net radio with simultaneous voice and IP capabilities.

TRC 3700 HF Manpack Radio

Thales



Frequencies/waveforms:	1.5MHz to 30MHz
Security:	Built-in digital encryption for voice and data and wide band hopping on the move, automatic hop band selection, intelligent frequency hopping with spectrum cleaning.
Notes:	This digital HF software defined radio handles digital ciphered voice and high speed data based on multiple waveforms; features fast 2G and 3G automatic link establishment.

TRC 9110 PR4G VHF Handheld Radio

Thales



Frequencies/waveforms:	30MHz to 88MHz
Security:	High grade built-in encryption, and advanced protection schemes including Fast Frequency Hopping (FFH), Free Channel Search (FCS) and mixed FH and FCS modes
Notes:	Handles simultaneous voice and data and features a built-in IP router. Capabilities include automatic data relay, dynamic voice/data allocation to boost data rate.

TRC 9105 VHF Handheld Radio

Thales



Power:	2 W
Frequencies/waveforms:	30MHz to 88MHz
Security:	High grade built-in programmable encryption, advanced EPM including Fast Frequency Hopping (FFH), Free Channel Search (FCS) and mixed FH and FCS modes
Weight:	1 kg without battery
Notes:	Handles simultaneous voice and data with, for example, a SuperMux mode with a throughput of 21.6 kbps and features a built-in IP router. Capabilities include automatic data relay, dynamic voice/data allocation to boost data rate. GPS built in.

TACTICAL RADIOS LISTINGS

F@stnet Twin

Thales



Frequencies/waveforms:
Notes:

VHF and UHF
F@stnet Twin keeps infantry leader in touch with soldiers through the embedded UHF soldier channel while being continuously in touch with the commanding level thanks to the embedded VHF channel. Designed for interoperability with legacy waveforms; handles simultaneous voice and data.

SquadNet soldier radio

Thales



Frequencies/waveforms:
Security:
Weight:
Notes:

865MHz to 880MHz, 100 talk groups over 50 channels with up to 50 users per channel/
programmable encryption with red/black architecture
250 including battery
"Unique" waveform ensures communication is maintained across urban, wooded and mountainous terrain. In open terrain SquadNet gives a 2.5km range point-to-point, extending to 6km with automatic network relaying, maintaining secure comms over IP networks with an Android app

BATS-D AN/PRC-161 Handheld Link 16 Radio

ViaSat



Power:
Frequencies/waveforms:
Weight:
Notes:

8W or 8mW transmit power
Link 16 Voice/Data waveform enables 26.8kbps through 1102 kbps TADIL J coded, free text variable format for enhanced throughput
1kg including battery
Radio fuses air and ground Situational Awareness (SA) in a handheld package designed for use at the tactical edge. Designed to be used vest-worn, handheld, or mounted by special operations and expeditionary forces, including Joint Terminal Attack Controllers (JTACs), Forward Air Controllers (FACs), Tactical Air Control Party (TACPs), as well as size, weight, and power constrained platforms.

R-168-1KE (Kvartz-N) handheld HF radio

Yaroslavl Radioworks



Power:
Frequencies/waveforms:
Security:
Weight:
Notes:

4W
1.5MHz to 9.999MHz
Offers clear and secure communications
0.85kg
Designed by the Sozvezdie JSC for both urban conditions and broken terrain with limited signal propagation plus long-range communications of up to 300km. Offers USB/LSB operation, compatibility with older radio types.

R-168-5KNE HF manpack

Yaroslavl Radioworks



Power:
Frequencies/waveforms:
Security:
Weight:
Notes:

8W max, 1W reduced
1.5MHz to 29.9999MHz
Built-in encryption, 256hop frequencies, 20hops/sec hop rate
3kg plus battery
Operates in simplex, dual-frequency simplex, FH, adaptive communication and listening watch modes. Also employs frequency telegraphy for automatic reception.

R-168-0.1UME VHF handheld

Yaroslavl Radioworks



Power:
Frequencies/waveforms:
Security:
Weight:
Notes:

0.15W min
44MHz to 56MHz
Built-in encryption for voice and data; with encryption, range falls from at least 1.2km to 1km
1.5 kg
Connects company and platoon commanders, squad leaders, soldiers. Voice prompt reports channel number, encryption operation and operating modes in darkness. Replaces R-168-0.1U and Barmitsa-RS.



IDEX 2021

INTERNATIONAL DEFENCE
EXHIBITION & CONFERENCE

ABU DHABI, UAE

AD

DEFENCE TECHNOLOGY FOR THE FUTURE

The Middle East and North Africa's largest defence and security exhibition returns to Abu Dhabi in February 2021.

The global defence industry will continue to meet influential VIP's, decision makers, military personnel and key investors at IDEX 2021. Attracting more than 1,250 exhibitors and 108,000 local, regional and international trade visitors and officials from government industry and armed forces.

For detailed information about IDEX 2021, please visit www.idexuae.ae

To book an exhibition stand or outdoor space, please email: shahla.karim@adnec.ae

21-25 FEBRUARY

Strategic Partner

EDGE

Principal Partner

مجلس التوازن الاقتصادي
TAWAZUN ECONOMIC COUNCIL

**توازن
TAWAZUN**

تأسس عام 1992 EST.

Official Media
Partner

**nation
shield**

Organised By

**CAPITAL
EVENTS**

Host Venue

ADNEC

In association with



UNITED ARAB EMIRATES
MINISTRY OF DEFENCE



UAE Armed Forces

R-168-0.1UME VHF handheld

Yaroslavl Radioworks



Power: 2W min
Frequencies/waveforms: 44MHz to 56 MHz
Security: built-in encryption for analogue data; digital data from external data terminal.
Weight: 1.5kg
Notes: Connects company and platoon commanders, squad leaders, soldiers. Covert voice prompting, modular for ease of repair, automated fill, sealed alloy case. Replaces: R-147, -162-0.1B, R-163-0.5R, R-163-1U, R-168-0.1U, R-168-0.5U, Barmitsa-RS.

R-168-0.1UME VHF monoblock handheld

Yaroslavl Radioworks



Power: 1W nominal, 5W max
Frequencies/waveforms: 33MHz to 56MHz
Security: Built-in encryption for voice and data; with encryption, voice range falls from at least 3km to 2.5km, data transmission range 2km.
Weight: 0.3kg
Notes: Monoblock radio connects company and platoon commanders, squad leaders, soldiers. Provides FM voice or 16kb/s secure voice, data rates of 2.4kb/s or 16 kb/s via RS-232 interface.

R-168-0.5MKME VHF handheld

Yaroslavl Radioworks



Power: 1W min
Frequencies/waveforms: 30MHz to 80MHz
Security: Built-in encryption of voice and data, frequency hopping.
Weight: 0.9kg
Notes: Provides single- and multi-channel clear and secure tactical comms. Features rechargeable battery, two antenna types, microphone headset. Range for simplex and double-frequency simplex operation 3km with ASP-1.5 antenna, 1.5km with ASP-1.0 antenna or 2 and 1 km with FH.

R-168-0.5UDE VHF

Yaroslavl Radioworks



Power: 1W nominal, 5W max
Frequencies/waveforms: 146 MHz to 174MHz
Security: Encrypted voice and data, whisper mode
Weight: 0.3kg
Notes: Enables open and secure comms with R-168 system on coincident frequencies, connects company and platoon commanders, squad leaders, soldiers, allows them to communicate with aircraft, warships. Range up to 5km.

R-168-5UN-1E VHF manpack with digital display

Yaroslavl Radioworks



Power: 1W low, 8W high
Frequencies/waveforms: 30MHz to 87.975MHz
Security: clear and secure analogue via built-in ciphering unit; digital data from external data terminal
Weight: 11. kg with battery
Notes: Provides platoon, company, battalion coms. Offers simplex or two-frequency simplex at any of 6 preset frequencies, remote control at up to 500 m, emergency data erasure. Replaces heavier R-159, R-159M, R-163-10U.

R-168-0.5UDE UHF monoblock radio

Yaroslavl Radioworks



Power: 1W nominal, 5W max
Frequencies/waveforms: 146MHz to 174MHz
Security: 1 kb/s secure voice, built in encryption for analogue data, digital data from external terminal
Weight: 0.3kg
Notes: Connects company and platoon commanders, squad leaders, soldiers through tactical command link allows them to communicate with aircraft, warships, rest of R-168 system at coincident frequencies. Range is up to 5 km.

R-168-0.5UDE UHF portable radio set

Yaroslavl Radioworks



Power: 1W nominal, 4W max
Frequencies/waveforms: 390MHz to 440MHz
Security: analogue secure data protected with built-in encryption unit; digital data delivered from external data terminal, encrypted whisper mode
Weight: 1.5kg
Notes: Connects company and platoon commanders, squad leaders, soldiers, allows coms with aircraft, warships. Input of modes, frequencies, keys automated. Offers 10 hours continuous operation.



ON THE COVER:

The Army Futures Command demonstrated its Radio Interoperability Capability - Universal (RIC-U) at the Aberdeen Proving Ground in May, 2019. It provides a voice bridge for tactical radios that will allow US forces to talk with allies during multi-national operations, yet still protect access to the Army's tactical network. (DVIDS)

Tactical Radios Supplement

Supplement to **ARMADA** Issue 5/2020
 Volume 44, Issue 5, October/November 2020

ARMADA

is published bi-monthly by Media Transasia Ltd.

Copyright 2012 by Media Transasia Ltd.

Publishing Office: Media Transasia Ltd.,
 1603, 16/F, Island Place Tower, 510 King's Road, Hong Kong

Editor-in-Chief: Andrew Drwiega

Chairman: J.S. Ubero

President: Egasith Chotpakditrakul

Chief Financial Officer: Gaurav Kumar

General Manager: Jakhongir Djalmatov

International Marketing Manager: Roman Durksen

Digital Manager: David Siriphonphutakun

Sales & Marketing Coordinator: Wajiraprajan Punyajai

Art Director: Hatsada Tirawutsakul

Circulation Assistant: Yupadee Seabea

Advertising Sales Offices

■ FRANCE/SPAIN

Stephane de Remusat, REM International

Tel: (33) 5 3427 0130

E-Mail: sremusat@rem-intl.com

■ GERMANY

Sam Baird, Whitehill Media

Tel: (44-1883) 715 697, Mob: (44-7770) 237 646

E-Mail: sam@whitehillmedia.com

■ TURKEY / EASTERN EUROPE / UK

Zena Coupé

Tel: +44 1923 852537, zena@expomedia.biz

■ NORDIC COUNTRIES/ITALY/SWITZERLAND

Emanuela Castagnetti-Gillberg

Tel: (46) 31 799 9028

E-Mail: emanuela.armada@gmail.com

■ RUSSIA

Alla Butova, NOVO-Media Ltd,

Tel/Fax: (7 3832) 180 885, Mob: (7 960) 783 6653

Email: alla@mediatransasia.com

■ USA (EAST/SOUTH EAST)/CANADA (EAST)

Margie Brown, Blessall Media, LLC.

Tel: (+1 540) 341 7581

Email: margiespub@rcn.com

■ USA (WEST/SOUTH WEST)/BRAZIL/CANADA (WEST)

Diane Obright, Blackrock Media Inc

Tel: (+1 858) 759 3557

Email: blackrockmediainc@icloud.com

■ ALL OTHER COUNTRIES

Jakhongir Djalmatov

Tel: +66 2204 2370, Mob: +66 81 6455654

Email: joha@mediatransasia.com

Roman Durksen, Tel: +66 2204 2370, Mob: +66 83603 7989

E-Mail: roman@mediatransasia.com

Annual subscription rates:

Europe: CHF 222 (including postage)

Rest of the World: USD 222 (including postage)

Controlled circulation: 26,050 (average per issue)

certified by ABC Hong Kong, for the period

1st January 2017 to 31st December 2017.

Printed by Media Transasia Ltd., 75/8, 14th Floor,

Ocean Tower II, Soi Sukhumvit 19, Sukhumvit Road,

Bangkok 10110, Thailand.

Tel: 66 (0)-2204 2370, Fax: 66 (0)-2204 2390 -1

Subscription Information: Readers should contact the

following address: Subscription Department,

Media Transasia Ltd., 75/8, 14th Floor, Ocean Tower II,

Soi Sukhumvit 19, Sukhumvit Road, Bangkok 10110, Thailand.

Tel +66 2204 2370 Fax: +66 2204 2387

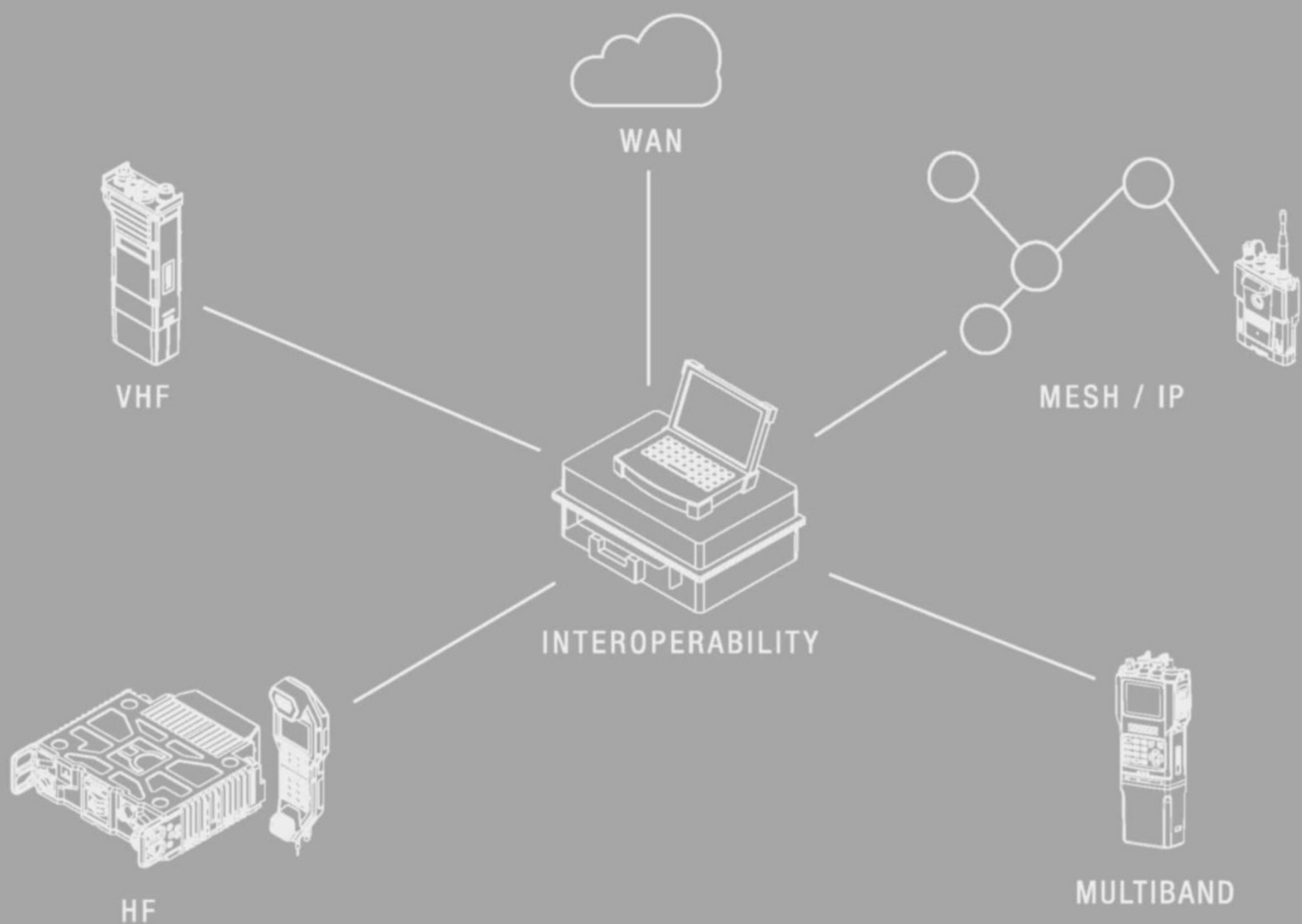
Email: accounts@mediatransasia.com

www.armadainternational.com

SOLUTIONS PROVIDER



A complete systems and solutions communications provider at the tactical edge. Enabling interoperability, scale and reliability for multinational coalition operations and soldier modernisation.



BE HEARD ON THE FRONT LINE

TACTICAL COMMUNICATIONS SOLUTIONS

The Palletised Load System PLS and DROPS were originally developed to provide a way to deliver large quantities of artillery ammunition to forward positions while reducing the need for handling at the delivery site.



RETHINKING RESUPPLY TO THE FORWARD LINE

Logistical resupply may not seem glamorous but it is critical to success or failure in combat, particularly when forces are dispersed or in a peer-to-peer conflict.

By Stephen W. Miller

Providing fighting arms with the essentials of ammunition, food, water, fuel, parts and the many other items is a constant challenge, with the supply of ammunition being one of the most crucial tasks among these. Moving, storing and delivering ordnance ranging from small arms bullets, to artillery shells, rockets, and guided missiles, also referred to as Class V, requires organisation, procedure and assets specific to that task. To accomplish this in a variety of terrain, weather, and tactical scenarios often requires specifically designed equipment and systems.

ARTILLERY AMMUNITION

Moving and delivering artillery and larger mortar rounds from storage magazines to forward combat users confronts major and unique difficulties. These items are heavy, difficult to handle and often utilise special packing for safe storage and transport. They also can also be consumed

in large quantities quickly when active combat occurs requiring moving large amounts of munitions in short order. These factors combine to make it preferable that ammunition be moved with as little handling as possible. Ideally it should be delivered directly to the final user in the combat zone who may well be in contact with the enemy.

Reliably providing ammunition to artillery is especially critical yet with each projectile in the 155mm calibre around 40-50kg (88-110lbs) alone, plus its charges, it is not a simple task. In addition, in response to increasingly effective counter-battery capabilities artillery must be more mobile changing its location after fire missions which can preclude the stockpiling of ammunition at gun positions. The movement of artillery stocks forward was simplified by the adaption of a commercial technique combining the use of 'flat racks', essentially flat metal pallets with an assembly on one end which hooks into a

lifting device on a specially equipped truck.

As Mike Ivy, senior vice president International Programs at Oshkosh Defence, a principle supplier of the US Army Palletised Load System (PLS) explained, "It is a simple yet extremely efficient system. The PLS configured truck backs up to the rack, the driver deploys the hook attaching to the assembly on the flatrack and then lifts it onto the rear chassis. The entire process takes under a minute. Upon reaching the delivery point he reverses the process lowering the flatrack to the ground. The hook automatically disengages and the driver is able to depart never leaving the cab."

The PLS and United Kingdom DROPS (dismountable rack offload and pickup system) as well as compatible similar French, German and other NATO systems use a standardised rack with a 15 metric ton (16.5 short ton) capacity. Further developments have provided a flatrack compatible trailer, a container handling



Hanwha's K10 Ammunition Resupply Vehicle employed with the 155mm self-propelled K9 howitzer can replenish a gun's on-board ammunition in five minutes.

unit that can carry 20ft ISOs with need for a flat rack and the CROPS (containerised roll-in/roll-out platform) where the rack fits inside the ISO. An Enhanced PLS includes the Movement Tracking System (MTS) that monitors the location and displays the load using a Global Positioning System (GPS). It also provides two-way digital messaging to both track logistics assets and redirect them to a new delivery site as necessary. Given the increasingly fluid nature of the forward battle space, the targeting of artillery and its associated resupply elements, and the push for forward resupply the armouring of the PLS and other logistics vehicles undertaken in response to insurgent attacks has taken on a new importance. By providing previously lacking protection to drivers it enhances their ability to perform closer to the enemy less threatened by indirect fire shrapnel.

Readily supplying artillery does not end with the dropping of the flatrack. It must then be transferred to the guns themselves. This remains a key problem for towed guns, however, it is being addressed in a number of self-propelled artillery through AARVs (Armoured Ammunition Resupply Vehicles). The Republic of Korea's Hanwha K10 is noteworthy in its approach to addressing this task. ShinYoung Park Manager Overseas Business Team at Hanwha Land Systems explained "K10 is teamed with Hanwha's K9 Thunder self-propelled 155mm howitzer. It is a fully-automated ammunition carrier and reloading system. Its task is to replenish the K9 using its 104 projectiles and 504 propellant charges. It collects these from resupply trucks or forward stocks and moves them directly to the Thunder. Crewmen of neither vehicle are exposed in the transfer process which can move 10 rounds per minute over its electrically driven telescoping arm meaning it can completely rearm a K9 in five minutes. The

K10 provides for the secure availability of ammunition for the guns without taking them off-line and losing their firepower at a critical moment."

COMBAT REPLENISHMENT

Mechanised combat units have the benefit of a vehicle which can carry additional supplies of ammunition for both its weapons and those of embarked infantry. As a result they have greater combat endurance and can engage in fire fights with less concern of running low on ammunition. Onboard ammunition stocks increase the ability for mechanised and motorised forces to conduct extended independent combat action.

Reducing the demand to replenish Class V also permits focus on other demands

such as Class III – fuel. Still the intensity of combat can see high ammunition expenditures. Anticipating this a several armies have introduced armoured logistics and support vehicles, usually variants of an already widely fielded combat vehicle but configured with a large rear compartment specifically to accommodate loads. The US Marine Corps included a LAV- logistics variant in its fleet and currently the Canadian Forces are fielding their wheeled LAVIII Armoured Combat Support Vehicle (ACSV) with a cargo role. Norway has selected a tracked ASCV from FFG, plus the ARTEC Boxer family includes a cargo logistic module that can accept two standard one tonne pallets for the Dutch Army. The US Army's Armoured Multi-Purpose Vehicle description suggests it also has a resupply capacity although it is not reflected as a specific mission.

For light infantry having adequate ammunition and other essential goods this is a continuous and serious concern. The dismounted soldier is limited to the ammunition that he is able to carry for a rifleman which may be around 80 rounds, for the machine gun team possibly 600 rounds, and for a light mortar crew maybe 20. This basic load can be quickly exhausted in an engagement when they need to be resupplied. The problem for these light



GDLS-Canada

The Canadian Army is currently procuring the Armoured Combat Support Vehicle which includes a cargo carrying capability.



The Rheinmetall Defense Mission Master can carry 600kg (1320lbs) moving either autonomously or automatically following a soldier.

‘optionally-manned’ version of its MRZR that program manager Patrick Zech said “allowed for both traditional driving even at high speeds and autonomous operation when preferred.” The MUTT and Mission Master can travel without soldier control either autonomously or automatically by following a soldier (referred to as ‘leader-follower’). With these robotic cargo carriers a rifle company could be accompanied by a resupply of readily available ammunition (33 cans of 5.56mm could be loaded on one MUTT). In addition, given advances in autonomous point-to-point navigation it may be also possible for these UGVs to be programmed to transport ammunition and other supplies from the rear to forward units.

AUTONOMOUS CONVOYS

Capitalising on the possibilities that robotics may offer, the concept of using current technologies to provide self-driving truck convoys is viewed as a way to

units is their very limited capability for carrying additional ammunition close at hand and the difficulties in providing responsive resupply. This is particularly an issue for heavier ordnance like portable anti-tank guided missiles - a Javelin is 15.9kg (35lbs) - and mortar rounds. This is further complicated by the need for a solution that can travel where the unit goes and should not take soldiers away from combat duties.

The development and use of autonomous ground vehicles is beginning to show as an alternative to this task. Systems like the Rheinmetall Defence Mission Master provide a small all-terrain capable cargo carrier that will carry 600kg (1320lbs) of ammunition and other supplies. Retired General Alain Tremblay, a vice president at the company shared that “a driving factor for Unmanned Ground Vehicles (UGVs) like Mission Master is the need to provide the essential capability without the need to dedicate soldiers to the task.” The US Army in July 2020 awarded a contract to General Dynamics Ordnance and Tactical Systems for a similar capability. Their multi-wheeled MUTT is to be fielded to units like the 82nd Airborne and 10th Mountain Divisions. Both had previously used light all-terrain vehicles like the Polaris MRZR but these require a soldier to drive. Polaris proposed an



Oshkosh Defense's TerraMax - the movement of a convoy of unmanned vehicles has been successfully demonstrated in the field with as many as nine unmanned and one manned vehicle. However, the company is confident a fully autonomous convoy is feasible.



The Norwegian Army has FFG of Germany preparing its own ACSV (Armoured Combat Support Vehicle) based on the PMMC G5 (Protected Mission Module Carrier).

more efficiently move supplies from depots with fewer soldiers. The idea is actually building off commercial demonstrations conducted as early as 2015 by Daimler Trucks with its Highway Pilot system. The US Army's Expedient Leader-Follower envisions nine unmanned trucks with a soldier driving the lead. However, Oshkosh Defence and Robotic Research has suggested a completely autonomous convoy is within reach. Oshkosh's program manager for Autonomous Vehicles, Chuck Bunton stated: "The technology does exist, but we are not there yet with acceptance". Still the Army has proposed an Automated Ground Resupply Program for as early as 2022. The use of automated resupply offers definite benefits on well established and secure routes. How far the self navigating approach can currently be applied remains to be seen, particularly across unfamiliar terrain.

New Challenges for Combat Logistics Resupplying in counter-insurgency presented extended communication routes that could be vulnerable to attack and disruption as well as the need to resupply remote outposts. Yet, future battlefields may be even more challenging. The presence of unmanned aerial systems over both forward and rear areas will make discrete movement and distribution of ammunition and fuel appreciably more difficult. This is coupled with the demonstrated capability for these detections to be quickly engaged by massive firepower. In addition, the anticipated increased dispersal and displacement of combat units will likely require logistics efforts to operate independently and able to take combat action to pursue their resupply missions. The enhanced difficulties in executing uninterrupted replenishment and increased need for these to be more rapidly accomplished is complicated by greater ammunition expenditures anticipated on the peer-on-peer battlefield. Past combat logistics processes and procedures now need extensive re-evaluation for conflict now and in the future. **A**

bertin
TECHNOLOGIES

MONITOR THE INVISIBLE

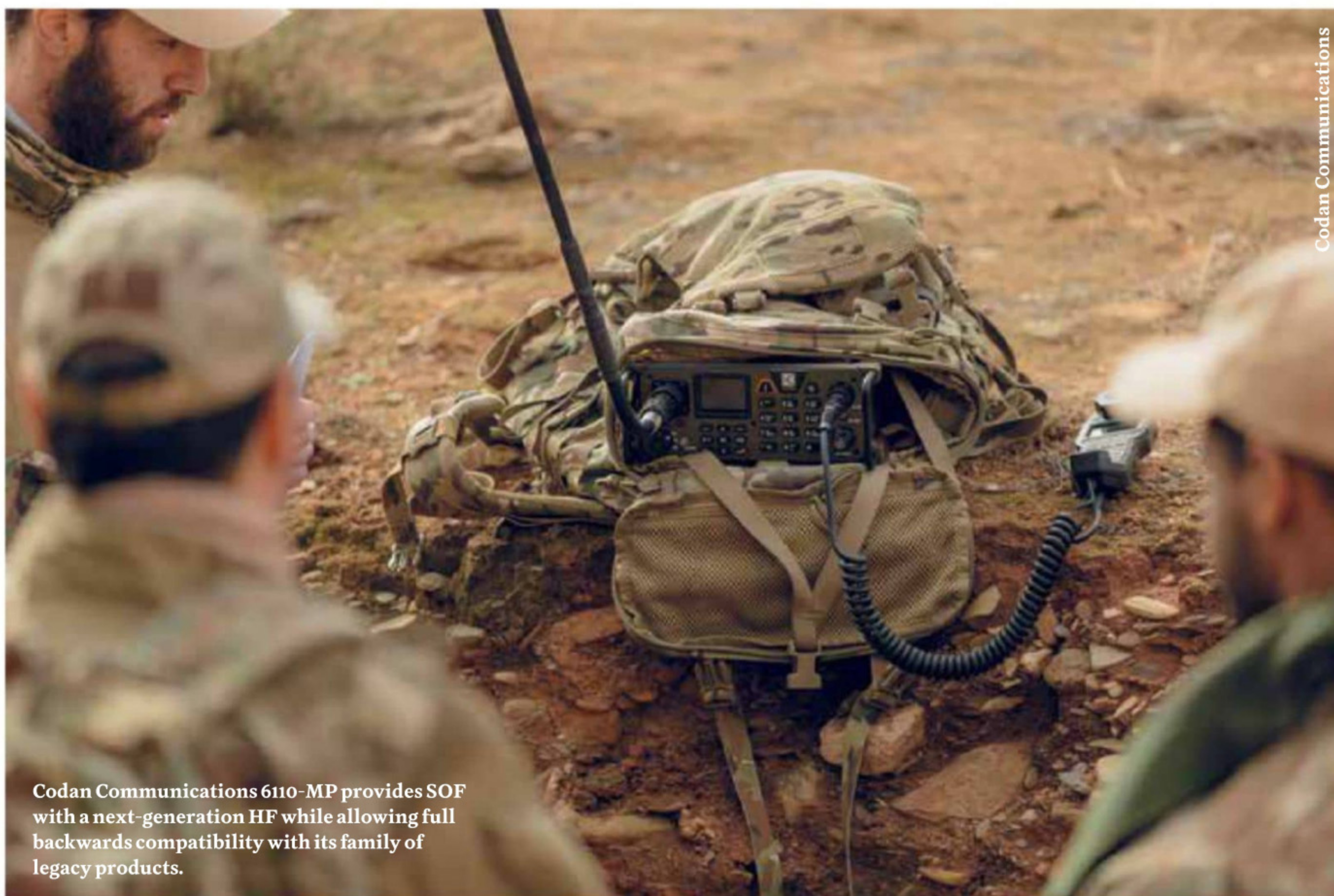
**OPTRONIC
SURVEILLANCE DEVICES**

**UNATTENDED GROUND
SENSOR SYSTEMS**

**CBRN THREAT
DETECTION SOLUTIONS**

WWW.BERTIN-INSTRUMENTS.COM

ENIM



Codan Communications

Codan Communications 6110-MP provides SOF with a next-generation HF while allowing full backwards compatibility with its family of legacy products.

HIGH FREQUENCY FOR SOF

Seeking to maintain secure and reliable connectivity, particularly in contested environments, special forces are turning to High Frequency software defined radios as an alternative to traditional reliance on satellite communications (SATCOM).

By Andrew White

In line with emerging demand signals from the Great Power Competition (GPC), special operations forces (SOF) small unit teams must operate in sub-threshold warfare environments in the face of mature electronic warfare threats from near peer and high capability adversaries.

Examples include ongoing operations in eastern Europe, where coalitions of NATO SOF units are tasked with the military assistance of indigenous special mission units in Ukraine. As industry sources confirmed to *Armada International*, small unit teams are procuring High

Frequency (HF) software defined radios (SDRs) in order to bypass electromagnetic interference from Russian military electronic warfare (EW) units stationed along the border.

Consequently, SOF units around the world are unleashing requirements to purchase next-generation HF SDRs with examples include potential programmes in France, Germany and the United States (US) to name just a few.

Speaking to *Armada International* at the SOF Industry Conference on 12 May 2020, Program Executive Officer for Command, Control, Communications and Computers

(C4), Deb Woods spoke of the updated plans to equip the US Special Operations Command (USSOCOM) with a next-generation HF solution.

“Partnerships are ongoing with the services including the US Navy regarding a government owned wideband [HF] waveform. As well as capabilities we have today, we want to take advantage of smaller SDRs to provide a government-owned kit to support SOF whether they are operating in some kind of unconventional warfare or working with partner national forces who also want a wideband capability,” she told *Armada*.



Ministry of Defence
Thailand



Power of Partnership

Tri-Service Asian Defense & Security Exhibition, Conference and Networking Event



1 - 4 November 2021

IMPACT Exhibition and Convention Center,
Muang Thong Thani, **Thailand**

10th
EDITION



Organised by:



For more information please contact:

Ms. Yaowalak Chuvichien, Project Manager

+66 (0) 2036 0500 ext 212

Yaowalak@asiandefense.com

Official Publication
and Official
ShowDaily
Publisher:



Official Online
Show daily:



Official Bilingual
Show daily:



Official News Online
and Web TV:



Officially Supported by:



www.asiandefense.com

[f](#) Defense and Security

[t](#) @DefenseThailand

[in](#) Defense Security Thailand



VIDEOS

Spanish Sharpshooter teams trained in a forest environment, improving their shooting stances and surveillance capabilities, as part of NATO exercise *Noble Jump 2017*. They also practised transferring data and images using HF radios, some of these being sent back directly to Spain's Special Forces command.

As of 18 September 2020, the USSOCOM has yet to publicly release a requirement regarding the procurement of a next-generation HF SDR.

A former French SOF operator now working in the industry, also confirmed to *Armada* this so-called "resurgence of HF in special operations" over the past few years.

Referring back to special operations in the 1990s, which included a focus on People Indicted for War Crimes (PIFWIC) in the former Yugoslavia, the source described how legacy HF radio sets had lacked the required data throughput to support surveillance and reconnaissance missions tasked with the positive identification of war criminals.

"The special forces task was simple: Priority Intelligence Requirement (PIRi) was to collect, to find, and to arrest PIFWICs and defer them to 'The Hague' international court. To arrest those persons, a track began, and before proceeding to the intervention to arrest them, we had to make sure that it was the correct person, and that the intervention teams had all the details concerning the environment.

"The intelligence collected was open source, but human intelligence (HUMINT)

was delivered by some commandos hidden during many weeks in difficult conditions close to the alleged criminals house.

"At this time, the technology of the radios used permitted teams to send small text messages, but the speed of the data wasn't good enough to send pictures of the person, which was mandatory before any operations. I remember once, it took me four hours to send a 10kb photo with the resolution of a stamp," the source continued.

"At the same time, satellite communication systems emerged as a technological 'revolution', especially INMARSAT with Mini M satellite terminals. Small, light, with a pretty good data speed (2,400bps), SATCOM started to compete with, and finally replace, HF systems in the field. This was the case few years later in Afghanistan where SATCOM systems were used by SOF to conduct combined operations and definitively buried HF radios, he added.

ENHANCED HF

Since then, HF has witnessed a series of enhancements which have significantly changed the opinion of SOF operators

considering utility of the SDR type.

These include decreased SDR weights to less than 5kg; increased radio autonomy providing operators with up to 72 hours use on a single battery; the full spectrum of types of calls including voice, text, GPS request and sending; increased data speeds with robust waveforms using 3G ALE technology; and finally, easy to use software for programming and data.

"And probably the most important point - no need to be trained over several months to use those 'smart radios' due to ease of use interfaces like a smartphone. If the signaller of the commando team is killed in action or wounded, any of his team partners would be able to use the radio," the source stated.

Additional benefits include the cost-free nature of HF, which bounces signals off the Ionosphere rather than relying upon expensive leasing or ownership of geo-stationary satellites.

"Special forces members are not dependent upon any third nation or any satellite operator. So while SATCOM will not disappear from a SOF small unit team, HF is now in a position to supplant it," the source concluded.

Solutions currently available to SOF include Codan Communications' 6110-MP which is part of the company's Sentry-H family of products, designed to meet the demands of the "modern battlefield whilst offering full backwards compatibility with legacy products", according to Codan literature.

"The 6110-MP is one of the smallest, lightest form factor manpack HF radios available, without compromise on capabilities. It delivers a rugged SDR solution for military organisations that demand uncompromised, secure voice and data communications, while on the move," a company statement explained.

The manpack, which provides a power output of 30W, has a maximum battery life of up to 79 hours dependent upon operational utility. Comprising less than 4.7kg in weight, the SDR is ruggedised up to MIL-STD-810G standards.

The solution also includes an embedded GPS in addition to IP connectivity over Ethernet/WiFi and USB. Encryption is provided by AES-256 and CES-128 communications security.

According to Felix Wickenhäuser, technology consultant at military radio communications specialist JK Defence



A US Marine with Marine Rotational Force-Europe 19.2, uses a Norwegian Army AN/PRC-150 radio alongside a Norwegian soldier during high frequency communications training in Norway, during 2019. MRF-E focuses on regional engagements throughout Europe by conducting various exercises, mountain-warfare training, and military-to-military engagements, NATO SOF units rely upon HF SDR technology to not only ensure connectivity in contested environments but also cost-effective interoperability with partner nation forces.

& Security Products, HF SDRs provide reliable and long range communications for SOF teams operating at reach and in complex operating environments such as the Arctic or mountainous areas where it can be hard to acquire a satellite signal due to physical barriers.

"Things even worsen once a near-peer adversary has qualified EW-assets. Especially then, waveforms featuring so called LPI / LPD (low-probability of interception/detection) methods are a critical advantage," Wickenhäuser explained.

TECHNOLOGY FOCUS

"Satellite communications are also vulnerable to space kill-vehicles or counter-satellite missiles. Furthermore the operation of HF radios does not require costly infrastructure," he said.

"The market is heading for higher data rates along with even smaller form factors, such as HF-handheld radios. This allows the implementation of entirely new concepts of operation, as the communication at the tactical edge is no longer limited to shorter-range V/UHF radios.

"From a technical point of view, we will see direct-sampling architectures as the foundation of even more advanced waveforms / transmission methods. Even though higher data rates are mostly played as the key advantage of modern HF radios, this is only half the truth. "Wideband HF also allows for even more advanced error correction algorithms thus allowing more robust links even under very challenging channel conditions. It is important to also consider this side of things. Usually you see a trade-off between data rate (payload) and

SUPPORTED BY

THIS FAIR IS ORGANIZED WITH THE AUDIT OF TOBB (THE UNION OF CHAMBERS AND COMMODITY EXCHANGES OF TURKEY) IN ACCORDANCE WITH THE LAW NO.5174.



L3Harris Technologies

L3Harris Technologies' AN/PRC-160 is in use with multiple SOF units around the world thanks to its increased throughput and reduced form factor.

robustness," he continued.

JK Defence and Security Products is partnered in Germany with L3Harris Technologies which has designed the AN/PRC-160 as a next-generation HF SDR that is already in service with multiple undisclosed SOF units in Europe.

As Wickenhäuser explained: "The PRC-160 is at the forefront of the HF radio revolution. Its intuitive operation along with even higher data rates make it a future-proof package. Designed as a system, matching body-worn antennas provide best possible transmission. Furthermore the PRC-160 is compatible with already fielded accessories like handsets, batteries, base-stations and remote-controls. Known MMI concepts also apply to this radio.

"Its NSA-certified Type-1 cryptology also allows secure interoperability with NATO partners. Being a multiband transceiver the radio can also communicate in the widely used VHF-band. This multiband system is also the world's first and only HF manpack meeting new NSA crypto-modernisation standards," he concluded.

According to L3Harris literature, the AN/PRC-160 provides data rates up to 10X higher than legacy HF radios, as well as enhancing interoperability between US

and coalition force elements across a battlespace.

Operating between 1.5-60MHz, the AN/PRC-160 provides a power output of 20W in HF mode, providing data rates up to 120kbps supported by optimal channel selection which responds to real-time conditions.

The SDR includes embedded SAASM or commercial GPS receiver to ensure accurate Position Location Information for enhanced Situational Awareness.

INVESTING IN HF

Finally, Barrett Communications offers up its latest HF solution- the PRC-4090- with chief executive officer, Andrew Burt describing how HF solutions provide a cheaper and easier to option for SOF and their partner forces around the world.

"HF networks do not require the infrastructure of SATCOM which means countries including the US are reinvesting in HF as the backbone of key infrastructure. This is why HF lends itself ideally to military operations as well as homeland security, emergency services and critical national infrastructure as a last resort communications capability.

"HF can be readily deployable, providing end users with an immediacy in communications they are unable to achieve with other communications mediums in that first instance," Burt continued while hailing its utility to support special operations at the tactical edge.

The PRC-4090 was unveiled to the market at DSEi in September 2019, following its development on the back of the 4000-series of SDRs by Barrett Communications. Capable of providing SOF small unit teams with secure email, data transfer and telephone connectivity over the HF networks, in addition to 4G LTE and MANET networks, the transceiver can be controlled by smartphone, tablet or laptop using Barrett's 4000 Series HF Remote Control App.

Operating between 1.6MHz-30MHz in Tx; and 250-KHz-30MHz in Rx frequency ranges, the PRC-4090 retains the capacity to manage up to 1,000 channels. The PRC-4090 platform is capable of transmitting in power outputs of 10, 30 and 150 Watts with optional transportable high power amplifier options up to 1kW.

The PRC-4090 also comes with options for Advanced Frequency Hopping technology, providing operators with between 5 and 25 hops per second as well as an 8-digit hopping encryption key- a capability which Burt declares as providing "excellent protection against EW attacks".

The SDR can be attached to personal load carrying equipment for dismounted special operations. Furthermore, the radio can also be attached onto a tactical docking station for integration on board special operations vehicles.

Full Rate production of the PRC-4090 was started in the third quarter of 2020, Burt confirmed.

CONCLUSION

Critical to any special operation, irrespective of where such a mission takes place, is a communications plan which includes primary, alternate, contingent and emergency (PACE) capabilities.

In the SOF community, HF is unlikely to ever wholly replace SATCOM or MANET. However, it will increasingly be relied upon to satisfy one of the PACE requirements on the battlefield, dependent upon mission parameters. 



IS THIS TIME DIFFERENT?

Andrew Hunter

This year's Air Force Association Air, Space, and Cyber 2020 conference in the United States was another held virtually, a fitting choice since one of the most compelling presentations was about how a new 'digital trinity' of technologies would fundamentally change the way that military aircraft are designed, built, and sustained. Air Force acquisition executive, Dr. William Roper, argued that the combination of digital engineering, open architecture, and agile software development provided an opportunity to escape the traditional trade space of aircraft development to deliver new aircraft at a more rapid pace, with lower total production, modernisation, and sustainment costs. His objective is to funnel resources instead into research and development by planning to introduce blocks of new design aircraft, each planned for modest production inventories of 168 aircraft, with blocks spaced eight years apart. As previously discussed in this column, these same technologies have already begun to reshape the aerospace and defence industry.

The United States Air Force is not alone in anticipating that new digital approaches may change the game for aircraft development. The United Kingdom's Tempest programme, which has forged research partnerships with Italy and Sweden, is based upon a similar expectation that new technologies, especially leveraging a digital twin for design, will enable a more affordable multilateral approach to fighter development. For those who lived the dream of the F-35 programme from its early days, the story sounds a bit familiar.

Then too, there was the conviction that modern digital design approaches would make the process of development and testing shorter and easier. Production efficiencies due to digital design were also assumed, albeit the F-35 projected these efficiencies over a sizeable and lengthy production run. As it happened, many of these predicted breakthroughs did not materialise, and there is more than a little cynicism about whether a transformational change here is currently within our grasp. At the same time, it is worth noting that there is evidence in other industry sectors that transformational technologies often produce fundamental change only after reaching a tipping point. The question is whether this time is different.

Lending credibility to Dr. Roper's argument is that the hard part of aircraft development is increasingly digital already. It is the software that powers the radars, avionics, and other electronic systems on modern combat aircraft that provide an ever-increasing share of the aircraft's capability. That makes it easier to believe that a digital version of a future aircraft can be extensively flown, tested, and sustained in a digital environment. And to the Air Force's credit, they have developed a business case to support their life cycle cost analysis. It outlines savings in retiring aircraft after 17 years of service life, when they believe the sustainment cost curve bends up, and forgoing the cost of upgrading ageing aircraft in later decades. These savings are tapped to pay for the costs of developing the digital tools needed to support the Air Force's approach and to allow for more frequent aircraft design

competitions.

There are critical assumptions built into the Air Force's analysis. A big part of whether this time is different depends on whether these key assumptions are correct, that is, whether costs can be kept within the parameters upon which the business case depends. But suppose we grant the Air Force much of its case. There are still key issues to consider. One is the importance of people. While doing more in a digital environment reduces physical costs, digital work requires people, especially high-priced engineering and coding talent. Industry already faces challenges recruiting this talent, competing with high-paying technology companies for a scarce pool of eligible people. Complex software work has also proven challenging to deliver on schedule. While there is real hope that industry's performance can improve using agile and open software techniques, there is also significant risks that schedules will slip, and costs grow. While more design efforts will lead to greater competition among the primes, and perhaps the emergence of new competitors, there are also likely to be significant challenges getting suppliers to the performance level required. Perhaps most challenging is the question of whether we can create validated digital models that enable significantly greater virtual testing.

The support that digital engineering is getting from government officials around the world tells us that it is ascendant. The key will be improving our understanding of what makes it work, and ensuring we learn the right lessons in implementing this approach. **A**

Defence Beyond Limits



Precision is everything.

Leonardo's 127/64 LW gun enables operational advantage to Naval forces, worldwide - providing the highest rate of fire and the largest volume of ready to fire ammunition, which can be increased through the use of a fully integrated Automatic Ammunition Handling System.

Combined with VULCANO guided ammunition the 127/64 LW gun ensures pin-point accuracy at more than three times standard range, enhancing lethality and minimizing collateral damage.

Inspired by the vision, curiosity and creativity of the great master inventor – Leonardo is designing the technology of tomorrow.